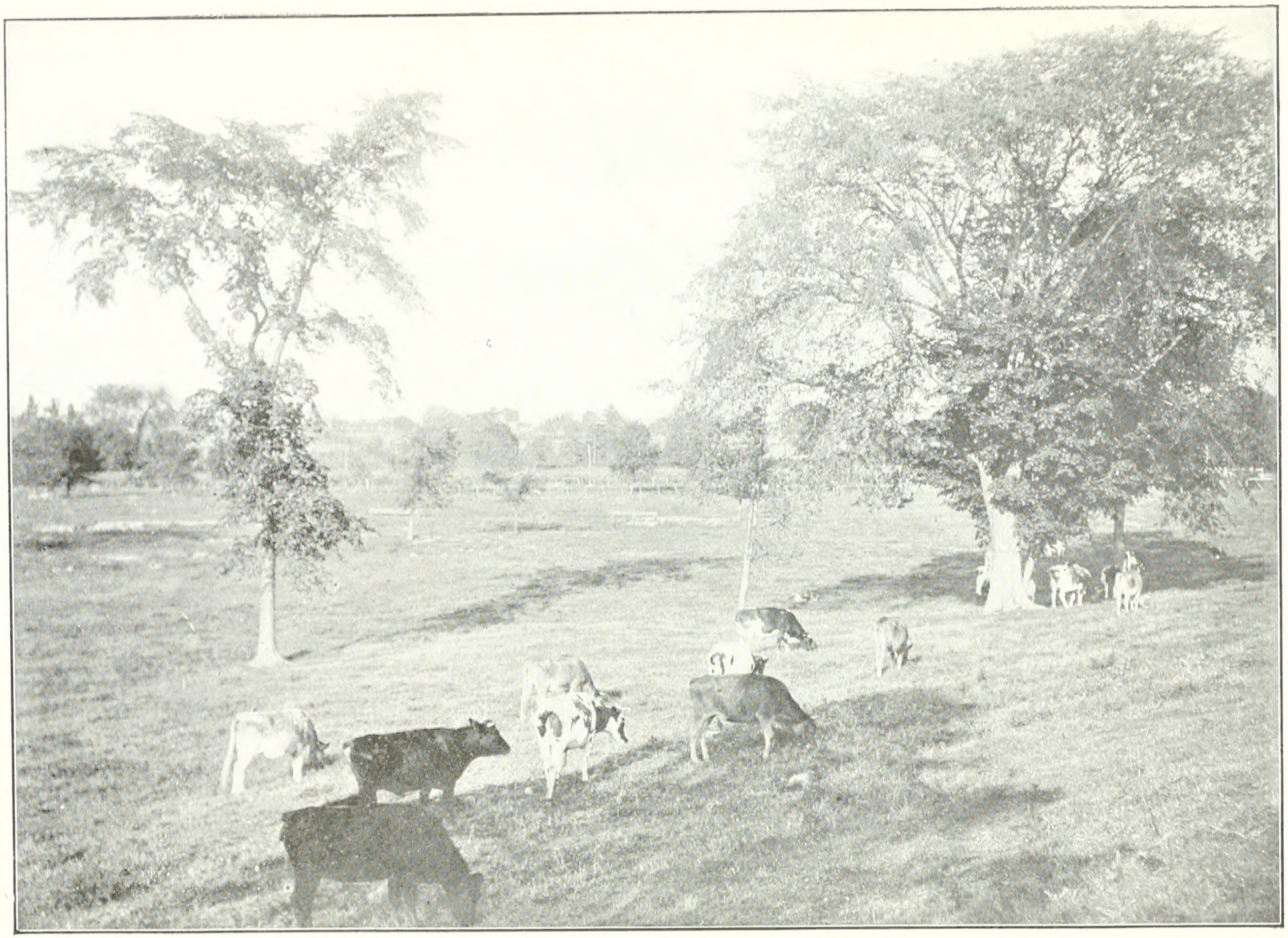


Cattle at Pasture on the Central Farm.

APPENDIX TO THE REPORT OF THE MINISTER OF AGRICULTURE

EXPERIMENTAL FARMS

REPORTS

OF THE

DIRECTOR	J. H. GRISDALE, B. AGR.
DOMINION AGRICULTURIST, (ACTING)	J. H. GRISDALE, B. AGR.
" HORTICULTURIST	W. T. MACOUN
" CEREALIST	C. E. SAUNDERS, PH. D.
" CHEMIST	FRANK T. SHUTT, M.A.
" ENTOMOLOGIST	C. GORDON HEWITT, D.SC.
" BOTANIST	H. T. GÜSSOW
POULTRY MANAGER	A. G. GILBERT
SUPT. EXPERIMENTAL STATION, CHARLOTTETOWN, P.E.I.	J. A. CLARK, B.S.A.
" " FARM, NAPPAN, N.S.	R. ROBERTSON
" " STATION, CAP ROUGE, QUE.	GUS. A. LANGELIER
" " FARM, BRANDON, MAN.	W. C. McKILLICAN, B.S.A.
" " " INDIAN HEAD, SASK.	ANGUS MACKAY
" " STATION, ROSTHERN, SASK.	WM. A. MUNRO, B.A., B.S.A.
" " " SCOTT, SASK.	R. E. EVEREST, B.S.A.
" " " LETHBRIDGE, ALTA.	W. H. FAIRFIELD, M.S.
" " " LACOMBE, ALTA.	G. H. HUTTON, B.S.A.
" " FARM, AGASSIZ, B.C.	P. H. MOORE, B.S.A.

FOR THE

YEAR ENDING MARCH 31

1912

PRINTED BY ORDER OF PARLIAMENT

OTTAWA
PRINTED BY C. H. PARMELEE, PRINTER TO THE KING'S MOST EXCELLENT MAJESTY
1912

[No. 16—1913.]

APPENDIX

TO THE

REPORT OF THE MINISTER OF AGRICULTURE

ON

EXPERIMENTAL FARMS

OTTAWA, March 31, 1912.

SIR,—I beg to submit herewith for your approval the twenty-fifth annual report of the work completed or in progress at the several Dominion Experimental Farms and Stations.

In addition to my own reports as Director and Acting Dominion Agriculturist, you will find also reports from the following Dominion officers of the Central Experimental Farm: The Horticulturist, Mr. W. T. Macoun; the Cerealist, Dr. C. E. Saunders; the Chemist, Mr. Frank T. Shutt; the Entomologist, Dr. C. Gordon Hewitt; the Botanist, Mr. H. T. Güssow and also from the Poultry Manager, Mr. A. G. Gilbert.

From the branch Experimental Farms and Stations, there are reports from Mr. J. A. Clark, Superintendent of the Experimental Station for Prince Edward Island at Charlottetown; from Mr. R. Robertson, Superintendent of the Experimental Farm for Nova Scotia at Nappan; from Mr. Gus. A. Langelier, Superintendent of the Experimental Station for Central Quebec at Cap Rouge; from Mr. W. C. McKillican, Superintendent of the Experimental Farm for Manitoba at Brandon; from Mr. Angus Mackay, Superintendent of the Experimental Farm for Southern Saskatchewan at Indian Head; from Mr. Wm. A. Munro, Superintendent of the Experimental Station for Central Saskatchewan at Rosthern; from Mr. R. E. Everest, Superintendent of the Experimental Station for Northwestern Saskatchewan at Scott; from Mr. W. H. Fairfield, Superintendent of the Experimental Station for Southern Alberta at Lethbridge; from Mr. G. H. Hutton, Superintendent of the Experimental Station for Central Alberta at Lacombe and from Mr. P. H. Moore, Superintendent of the Experimental Farm for British Columbia at Agassiz.

These reports will be found to contain the results obtained in many lines of experimental and investigational work being carried on by the various officers at the several Experimental Farms and Stations. As must necessarily be not infrequently the case, the record is a report of progress made or a statement of conditions presently existing, in connection with lines of work now under way.

The increasing correspondence on agricultural, horticultural and cognate subjects indicates a very general awakening among Canadian farmers to the need for reliable assistance in the many problems and difficulties which confront them in their daily work.

These demands for help are met very largely by our reports and by the various bulletins which have been and continue to be issued from time to time as opportunity offers or as the completion of particular lines of experimental work justifies.

The included reports will be found to be considerably more brief than have been those submitted by the same officers for a few years past. It is proposed to still further reduce the volume of these annual reports and to issue more of the information that has heretofore been included therein in the form of timely bulletins, or seasonal supplementary reports.

It is hoped that the information contained in the accompanying volume may be of use to the many readers it is expected to reach.

I have the honour to be, sir,
Your obedient servant,

J. H. GRISDALE,
Director, Dominion Experimental Farms.

To the Honourable
The Minister of Agriculture,
Ottawa.

ANNUAL REPORT OF THE EXPERIMENTAL FARMS

FOR THE YEAR ENDING MARCH 31, 1912

REPORT OF THE DIRECTOR

J. H. GRISDALE, B.Agr.

FIELD CROPS OF THE DOMINION.

It may prove of interest to give some brief notes on the field crops of the Dominion for the season of 1911. The data given below have been obtained from the Census and Statistics Monthly, an official organ of the Federal Department of Agriculture. The figures given for 1911 in that publication, however, are based on those obtained during the taking of the census, and thus, while presumably much more accurate than those of former years, which were obtained from the reports of correspondents in all parts of the Dominion, they are not strictly comparable with the latter from the very fact mentioned. In view of the different bases on which the total yields were estimated for the two years, the fairest comparison is obtained by studying the differences in the average yields per acre and price per bushel or ton.

The total area under field crops in Canada in 1911 was 32,853,074 acres and the total estimated value of the crops harvested thereon $565,711,600.

In the following tables will be found the average yield per acre and average price obtained for the principal field crops for the years 1910 and 1911, the total production for each year, and the average yield and price obtained in the Eastern and Western provinces respectively.

Comparison of Yields and Prices Obtained for the Years 1910 and 1911.

Crop.	Average Yield per Acre.		Average Price per Bushel.		Total Production.	
	1910.	1911.	1910.	1911.	1910.	1911.
	Bushels.	Bushels.	$	$	Bushels.	Bushels.
Fall Wheat	23.49	22.19	.870	.825	16,610,000	26,014,000
Spring Wheat	15.53	20.63	.738	.611	133,379,600	189,837,300
Oats	32.79	37.76	.354	.364	323,449,000	348,187,600
Barley	24.62	28.94	.474	.566	45,147,600	40,641,000
Rye	18.35	18.89	.702	.774	1,543,500	2,694,400
Peas	16.93	15.80	.880	1.025	6,538,100	4,536,100
Buckwheat	26.77	22.69	.563	.641	7,243,900	8,155,500
Mixed grains	33.76	29.78	.512	.607	19,433,600	16,679,000
Flax	7.97	11.41	2.07	1.507	3,802,000	12,921,000
Beans	22.21	19.06	1.78	1.920	1,177,800	1,155,600
Corn (for husking)	57.00	59.39	.541	.648	18,726,000	18,772,700
Potatoes	147.14	143.82	.45	.60	74,048,000	66,023,000
Turnips, etc	402.36	373.92	.23	.23	95,207,000	84,933,000
	Tons.	Tons.			Tons.	Tons.
Hay and Clover	1.82	1.61	9.66	11.55	15,497,000	12,694,000
Fodder Corn	9.38	9.92	4.68	4.84	2,551,000	2,577,200
Sugar Beets	9.69	8.66	5.72	6.58	155,000	177,000
Alfalfa	.....	2.24	.....	9.868	.....	227,900

COMPARISON of Eastern and Western Provinces as to Yields and Prices Obtained.

Crop.	Eastern Provinces.				Western Provinces.			
	Average Yields.		Average Prices.		Average Yields.		Average Prices.	
	1910.	1911.	1910.	1911.	1910.	1911.	1910.	1911.
	Bushels.	Bushels.	$	$	Bushels.	Bushels.	$	$
Fall Wheat	25.24	20.95	.882	.872	12.59	24.99	.718	.733
Spring Wheat	19.72	17.95	1.031	1.00	15.38	20.73	.725	.607
Oats	36.17	28.88	.387	.473	28.82	46.64	.301	.281
Barley	29.06	25.8	.555	.712	21.14	31.56	.383	.465
Rye	.....	17.47	.....	.819	22.65	27.30	.595	.610
Flax	.....	13.57	.....	1.87	8.18	11.40	2.07	1.50
Potatoes	147.6	134.7	.436	.636	143.7	194.6	.586	.448
Turnips	406.1	384.2	.221	.216	273.1	299.4	.447	.355
	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.	Tons.
Hay and Clover	1.84	1.64	9.63	11.57	1.07	1.65	11.29	10.93
Fodder Corn	9.38	9.15	4.69	4.74	.....	7.71	.....	9.00
Sugar Beets	9.87	8.53	5.86	6.73	9.00	8.00	5.00	5.00
Alfalfa	.....	2.22	.....	10.81	.....	2.47	.....	.....

REPORT OF EXPERIMENTS IN THE PEACE RIVER DISTRICT.

FORT VERMILION,
PEACE RIVER, ALBERTA, March 31, 1912.

J. H. GRISDALE, B.Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit the fourth annual report of the work on the Experimental Station at Fort Vermilion.

The month of April, 1911, opened cold and continued so until the middle of that month when a rapid thaw set in with high temperature and no night frosts. It appeared as though seeding would commence about the 26th. A heavy snow storm amounting in all to 6 inches, set in, however, and delayed seeding until May 1, after which date it became general. The first half of May was very favourable for seeding and germination, the ground being in excellent condition, with plenty of moisture. Barley was sown on May 16th, wheat being already well up by that date.

At the opening of spring, the fruit trees and shrubs all appeared to have wintered well, many being in leaf by the middle of May. Two strains of Alfalfa survived the winter as also the Brome Grass. The orchard grass winter-killed completely.

The latter part of May and the first half of June was very dry and cold, a severe frost being registered on May 22nd. Fruit trees and shrubs seemed to show more indication of winter injury than at first thought.

In some parts of the district the effects of this cold dry weather were much more marked than on the Experimental Station and in its immediate neighbourhood.

On June 16, 1911 there was a very timely rain of $\frac{1}{4}$ of an inch.

Garden vegetables were attacked severely by cutworms during June and remedies could not be obtained in time to be of value that season.

The weather during the latter part of June and first half of July was very favourable for growth, the rainfall being abundant and the weather warm.

By the 17th of the latter month the Alfalfa, Timothy and Brome Grass had been cut, the last named especially giving a very heavy crop. Haying was general by this date, the crop being light on the uplands but good on low lands and swamps. During the remainder of July and during August there was an abundance of rain which delayed haying and harvest. By the 15th of the latter month, the second crop of Alfalfa had reached a height of 18 inches. Three plots of barley, (Claude, Champion and Sidney) were cut on the 7th.

Currants were picked on the 4th and raspberries were beginning to ripen on the 15th.

By September 3, harvest was general having been delayed by the wet weather. On the 11th the wheat was still in stook on the Station, with Red Fife and Kubanka still uncut. On this date 6° of frost were recorded.

In this neighbourhood, wheat was very good but farther away some damage was done by frost.

Three plots of winter wheat were sown, one on August 1st, one on August 15th and one on September 1st.

On the 14th of October, the foliage on the trees in the orchard was still green although some severe frosts had been experienced. By the 20th of the month the ground was frozen solid, no ploughing being done after that date. During the first two weeks in November the temperature reached 32° below zero several times .

Results of threshing indicate considerable damage by frosts. On my own farm the wheats were very good, except Red Fife; barley very good, oats only fair.

I have the honour to be, sir,

Your obedient servant,

(Sgd.) ROBERT JONES.

EXPERIMENTS WITH CEREALS.

These were all sown on plots of 1/30 of an acre each.

SPRING WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including head.	Character of Straw.	Average Length of Head.	Kind of Head.	Weight of Straw	Yield per Acre.	Weight per measured bushel after cleaning.
					In.		In.		Lbs.	Bush. Lbs.	Lbs.
1	Bishop.....	May 2	Sept. 5	127	48	Medium	3	Bearded..	8,280	73 ..	61
2	Early Riga.....	" 3	" 1	121	50	"	3¼	Beardless.	8,760	71 ..	63
3	Marquis.....	" 2	" 6	128	51	"	3½	"	8,760	70 ..	61.2
4	Preston...	" 2	Aug. 31	122	48	Stiff.	3	Bearded..	6,240	63 ..	63
5	Ladoga	" 2	Sept. 1	123	50	Weak.	3	" ..	8,100	61 ..	63.5
6	Red Fife.	" 2	" 13	135	48	"	3½	Beardless.	9,240	54 ..	58
	(Durum Wheat)										
1	Kubanka	" 3	Sept. 13	135	52	"	3	Bearded..	8,160	52 ..	59

OATS—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including head.	Character of Straw.	Average Length of Head.	Weight of Straw	Yield per Acre.		Weight per measured bushel after cleaning.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Banner	May 3	Aug. 25	115	54	Weak.	9	7,860	115	20	40
2	Improved Ligowo	" 3	" 17	107	52	Stiff.	9	7,610	112	2	42½
3	Tartar King	" 3	" 15	105	48	"	8	6,750	108	18	40
4	Excelsior	" 3	" 16	106	50	Medium	7	6,000	106	26	39

SIX-ROW BARLEY—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head	Character of Straw.	Average Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Mensury	May 4	Aug. 5	104	44	Weak	3	5,400	79	18	51
2	Claude	" 5	" 7	95	49	Strong	4	5,970	71	42	46
3	Champion	" 5	" 7	95	52	Medium	3¾	7,620	55	30	39½

TWO-ROW BARLEY—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Character of Straw.	Average Length of Head.	Weight of Straw.	Yield per Acre.		Weight per measured bushel after cleaning.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Sidney	May 4	Aug. 25	114	53	Medium	3¾	6,930	77	24	52
2	Canadian Thorpe	" 4	" 15	104	40	Strong	2½	5,250	48	6	51½

PEAS—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
						inches	inches	Bush.	Lbs.	Lbs.
1	Arthur	Medium	May 4	Aug. 29	117	55	2½	45	..	665

FIELD ROOTS.

On May 13, a 1/30 acre plot of each of the following roots was sown:—

Turnips.—Good Luck, Perfection Swede.

Mangels.—Mammoth Long Red, Giant Yellow Intermediate.

Sugar Beets.—Vilmorin's Improved, Klein Wanzleben.

Carrots.—Improved Short White, Half-Long Chantenay.

These plots, unfortunately, were completely destroyed by cutworms and no further supply of seed could be secured in time for a second sowing to be made.

POTATOES.

Carman No. 1.—Planted May 4 in nine (9) drills, 33 feet long. Amount of seed used 130 lbs.; yield 606 lbs.

Gold Coin.—Planted May 4 in seven (7) drills, 33 feet long. Amount of seed used 24 lbs.; yield 471 lbs.

Irish Cobbler.—Planted May 4 in 3 drills, 33 feet long. Amount of seed used 12 lbs.; yield 105 lbs.

Early Rose.—Planted May 5. Dug September 16. Yield 647 bushels per acre.

The potato crop was very good all through this district.

GRASSES AND CLOVERS.

Orchard Grass.—This was completely winter-killed.

Alfalfa.—Very strong growth. Two cuttings were made, the first yielding 2 tons, 1,250 lbs. per acre, and the second 1 ton, 100 lbs.

Brome Grass.—A heavy crop.

Sainfoin.—A heavy crop.

Timothy.—A heavy crop.

Canary Grass.—Sown May 4. Cut August 15. Yield 2 tons, 1,460 lbs. per acre.

The yield of hay in the Fort Vermilion district was generally good on the more low-lying lands.

VEGETABLES.

All of the vegetables suffered more or less from the cutworms, but what was left grew to a large size.

Asparagus.—In use from May 29 until well into August. That used this year was from an old bed of Conover's Colossal. Plants to the number of 80, from seed sown in 1909, were transplanted on May 30. On August 17, 105 plants were replanted from old beds in readiness for next spring.

Beans.—Varieties tested: Dwarf Black Wax, Dwarf Golden Wax, Improved Golden Wax, Challenge Black Wax. These were in use from the first week in August.

Celery.—Sown in hotbed, April 22. Transplanted May 31. White Plume Paris, in use August 10. Rose Ribbed Paris, in use August 14. Weight of one dozen of the former, 10 lbs., and of the latter, 9 lbs.

Garden Peas.—Varieties tested: Triumph, in use July 31, ripe August 25. Stratagem, in use August 5, ripe September 4. Gradus, in use July 20, ripe August 24. Admiral Dewey, in use July 27, ripe August 30. Witham Wonder, in use July 22, ripe August 22. Gregory's Surprise, in use July 19, ripe August 12. Premium Gem in use July 29, ripe August 19. American Wonder, in use August 1, ripe August 23. These were all sown on May 5.

Table Beets.—These were sown on May 9 and were pulled on September 19. Varieties tested: Early Blood Red Turnip, in use July 20; Flat Extra Early, in use July 25; Egyptian Extra Early, in use July 29; Nutting's Dwarf Red, in use August 2.

Table Carrots.—Early French Horn, in use July 15; Amsterdam Scarlet, in use July 29.

Lettuce.—Sown in open, May 10. The following varieties were tested and all were found of good quality: Cos Trianon, in use June 12; Wheeler's Tom Thumb, in use June 10; Unrivalled Summer, in use June 6; Red Edged Victoria, in use June 18.

Radish.—Sown in open, May 10. Early Scarlet White-tipped Turnip, in use June 8; Winter Black Spanish, in use June 13, and were good all summer; Forcing Turnip Scarlet, in use June 12.

Rhubarb.—The old bed of Victoria was in use from June 6 to September 1. One packet of seed of Victoria rhubarb was sown in the hotbed the latter part of April and the young plants were moved to the open on May 26, furnishing a supply of vigorous young plants.

Parsnips.—Hollow Crown, sown on May 9 and dug September 20; of very large size, yielding 110 lbs. from one packet of seed.

Cabbage.—Sown in hotbeds April 22, and transplanted May 17. Were replanted four or five times on account of cutworms.

Varieties tested.—Early Paris Market, in use July 1; Fottler's Improved Brunswick, in use July 6; Early Jersey Wakefield, in use June 30; Savoy Extra Early, in use June 26. The weight of these was from 6 to 9 lbs. each.

Cauliflower.—Early Paris or Nonpareil, in use July 12; average weight, 6 lbs. Earliest Erfurt, in use July 18; average weight, 7 lbs.

Tomatoes.—Sparks' Earliana, Central Experimental Farm strain. These were sown in the hotbed on April 22 and were transplanted to the open on May 29. Of 106 plants set out all but 25 were destroyed by cutworms. From the 25 plants, about two bushels of partly ripe fruit was gathered.

Squash.—Planted May 8. A hole three feet deep was dug for each hill. This was filled with manure and a box without a bottom put in. Three seeds were then planted to each hill and a glass put over the top. When the plants were large and strong enough, the box and glass was removed without disturbing the plants. Good success was obtained in this way.

Varieties tested.—Summer Golden Crookneck, average weight, 5¾ lbs.; Hubbard, average 9½ lbs.; White Bush Scalloped, 2 lbs.; Mammoth Whale, 17 lbs.; White Congo, 11½ lbs.

Cucumber, treated in the same way. White Spine, average weight, ¾ lb.

Onions.—Varieties tested: Large Red Wethersfield, Danvers' Yellow Globe, Paris Silverskin.

Owing to the early part of the summer being so dry, the onions were all very small.

Table Corn.—Early Malakoff: in tassel, August 2; in silk, August 26; stalks 3 to 3½ feet high. No kernels were formed, as the corn was killed by frost on September 3.

Brussels Sprouts, Brocoli and Table Turnips were all destroyed by cutworms.

FRUITS.

The following varieties of cross-bred apple trees have done well during the season; only one, the Robin, fruited: Alberta, Charles, Tony, Prince, Golden, Magnus, Silvia, Robin, Pioneer, seedlings of Alberta, Golden and Silvia, and the Russian apple seedlings Varna, Charlamoff and Morden.

Of plums, Cheney and Aitkin were the only varieties which withstood the severe winter of 1910-11. These did well during the season of 1911.

Currants.—The following varieties of black currants did well and fruited: Eagle, Ontario, Bang-up, Magnus, Norton, Ethel, Eclipse, Topsy, Climax, Kerry, Saunders. Of red currants, the following fruited: Simcoe King, Rankin's Red, Cumberland, Red Dutch, Long Bunch Holland, Large Red and Greenfield. Of white currants, the following fruited: Large White, White Cherry, White Raisin, White Dutch, White Grape.

Of the two varieties of raspberries tested, Hubert and Heebner, the former did fairly well. The latter was late in blooming, and most of the fruit was destroyed by frost.

ORNAMENTAL TREES AND SHRUBS.

The following varieties of trees and shrubs did well, though many were cut back considerably by the severe winter of 1910-11:—

Acer Ginnala.
Acer dasycarpum.
Acer Negundo.
Acer tataricum.
Acer pictum.
Abies remonti.
Amelanchier vulgaris.
Betula alba laciniata.
Berberis Thunbergii.
Berberis sinensis.
Clematis montana.
Caragana arborescens.
Caragana grandiflora.
Caragana frutescens.
Caragana pygmaea.
Cotoneaster tomentosa.
Crateagus Arnoldiana.
Celtis occidentalis.
Crataegus Carrieri.
Ceanothus Americanus.
Lonicera alpina.
Lonicera Fenzlei.
Lonicera tatarica virginalis alba.
Lonicera Sullivanti.
Diervilla lutea.
Euonymus europaeus ovatus.
Euonymus linearis.
Hydrangea paniculata grandiflora.
Ligustrum amurense.
Green Ash.
Populus angustifolia.
Lycium europaeum.
Philadelphus Mont Blanc.
Douglas Spruce.
Pinus sylvestris.
Spiraea Billardi.
Picea pungens.
Pinus Strobus.
Quercus rubra.
Rhamnus frangula.
Ribes aureum.
Retinospora pisifera.
Spiraea sorbifolic
Russian Olive.
White Birch.
Spiraea arguta.
Willow Voronesh.
Thuya occidentalis.
Thuya occid. globosa.
Thuya occid. Columbia.
Thuya occid. Hoveyi.
Viburnum molle.
Juneberry.
Roses—
Persian Yellow.
Delicata.
Alberta.
Syringa (Lilac).
" *amurensis.*
" *Japonica.*
" *Pekinensis.*
" *Villosa.*
" v. Madame Casimir Perrier.
" " Chas. Joly.
" " Charles X.
" " Michel Buchner.
" " Emile Lemoine.
" " Jacques Calot.
" Congo.
" v. Mlle. Fernande Viger.
" " Mme. Abel Chatenay.
" " Souvenir de Ludwig Spath.

Flower Garden.

Variety.	Sown in open.	In bloom from.	Remarks.
Stocks, Ten Weeks	May 10	August 1	Fine Bloom.
Godetia	" 10	July 4	
Alyssum	" 10	" 4	
Mignonette	" 10	" 1	
Verbena	" 10	" 20	
Pansy	" 10	June 20	Plants from 1910 in bloom early in May.
Portulaca	" 10	July 29	
Aster, Semple's Branch'g	" 10	August 12	Very fine and large.
Giant Comet	" 10	Sept. 2	
Victoria Mixed	" 10	Aug. 30	
Clarkia elegans	" 10	July 22	Very good.
Sweet Peas	" 11	" 1	Very large.
Balsam, camellia	" 12	" 26	Good.
Celosia	" 12	August 4	
Marigold	" 12	July 30	
Scabiosa	" 12	July 22	Good.
Dianthus chinensis	" 12	June 28	Very fine.
Phlox	" 12	July 26	Very fine indeed.
Lobelia	" 12	" 20	
Nasturtium	" 12	" 1	
Primula	" 15	" 24	Very ffne.
Zinnia	" 15	August 1	
Nigella	" 15	July 21	
Morning Glory	" 15	August 19	
Calliopsis	" 10	July 19	Good.
Candytuft	" 13	June 29	Bloomed freely.
Centaurea	" 15	July 28	
Brachycome	" 15	" 15	Very good.
Chrysanthemum	" 15	" 6	Bloomed freely.
Poppy Snowdrift	" 13	August 3	Very good.
" Iceland	" 13	July 3	
" Double annual	" 13	" 4	
" Shirley	" 13	" 3	In bloom till frost.
" California	" 15	June 29	Very pretty.
Helianthus	" 15	July 27	
Delphinium	Plants from 1910 Set out	" 30	In bloom till Oct.
Antirrhinum	May 30	" 31	Start in hot bed, May 1.
Salpiglossis	May 16	August 7	

TABLE of Meteorological Observations taken at Fort Vermilion, Peace River District, Alberta, from April 1, 1911, to March 31, 1912, showing maximum, minimum, and mean temperature, the highest and lowest for each month with date of occurrence; also, rainfall, snowfall, and total precipitation.

MONTH.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total precipitation.	Number of days precipitation.	Heaviest in 24 hours.	Date.
	°	°	°	°	°		°							
April	40·23	11·11	29·12	25·67	69·0	22nd. ..	—26·0	4th.....	0·78	6·00	1·38	3	0·64	25th.
May	63·23	33·92	29·31	48·57	82·2	17th. ...	19·0	23rd. ...	0·41	.....	0·41	3	0·36	6th.
June	68·15	40·98	27·17	54·56	87·0	13th.. ..	29·0	4th.....	2·70	.....	2·70	9	1·43	19th.
July	73·23	44·97	28·26	59·10	90·3	25th.. ..	32·2	20th...	1·62	.....	1·62	8	0·79	3rd.
August	66·99	39·88	27·10	53·43	77·5	1st.. ...	31·5	8th, 31st	1·85	.....	1·85	8	1·24	11th.
September	58·23	28·86	29·36	43·54	76·0	16th.. ..	8·0	23rd....	1·32	.....	1·32	7	0·35	14th.
October	49·50	23·37	26·12	36·43	76·9	9th... ..	—3·5	31st	0.19	.....	0·19	3	0·09	16th.
November	21·16	—11·66	32·82	4·75	53·0	3rd.....	—33·5	15th....	... ..	4·00	0·40	3	0·20	20th.
December	10·83	—14·56	25·40	—1·86	35·5	16th.....	—58·5	28th ...	.....	3·00	0·30	1	0·30	23rd.
January	0·06	—23·15	23·22	—11·54	26·9	26th.....	—58·0	5th	.....	2·00	0·20	4	0·07	7th.
February	15·35	—12·22	27·57	1·56	35·0	23rd.. ..	—48·0	28th.. .	.....	3·25	0·32	6	0·10	14th.
March	30·09	—8·94	39·03	10.57	54·5	26th.....	—38·0	1st.	.....	0·50	0·05	2	0·02	24th.
									8·87	18·75	10·74	57		

SOME Weather Observations taken at Central Experimental Farm, Ottawa, as compared with those taken at Fort Vermilion, Peace River District, Alberta.

APRIL.

	Mean Temperature.	Highest Temperature.	Lowest Temperature.	Total Precipitation.	Heaviest in 24 hours.	Total hours Sunshine.	Average Sunshine per day.
	°	°	°				
Ottawa	39·44	81·2	3·6	1·47	0·60	257·4	8·58
Fort Vermilion	25·67	69.0	—26·0	1·38	0·64	175·3	5·84

MAY.

Ottawa	62·98	93·9	24·0	2·80	0·97	279·8	9·02
Fort Vermilion	48·57	82·2	19·0	0·41	0·36	233·9	7·54

JUNE.

Ottawa	64·62	88·0	45·4	3·64	1·48	233·1	7·77
Fort Vermilion	54·56	87·0	29·0	2·70	1·43	217·6	7·25

JULY.

Ottawa	71·46	97·8	48·0	2·79	1·08	326·7	10·53
Fort Vermilion	59·10	90·3	32·2	1·62	0·79	264·0	8·51

AUGUST.

Ottawa	70·31	97·6	42·6	1·47	0·64	278·7	8·99
Fort Vermilion	53·43	77·5	31·5	1·85	1·24	214·1	6·90

SEPTEMBER.

Ottawa	56.90	80·8	28·8	2·98	0·93	210·1	7·09
Fort Vermilion	43·54	76·0	8·0	1·32	0·35	165·7	5·52

OCTOBER.

Ottawa	47·17	72·0	23·6	2·13	0·93	152·1	4·90
Fort Vermilion	36·43	76·9	—3·5	0·19	0·09	141·2	4.55

NOVEMBER.

Ottawa	30·43	60·0	5·8	2·93	0.58	81·0	2·70
Fort Vermilion	4·75	53·0	—33·5	0·40	0·20	88·2	2·94

DECEMBER.

Ottawa	26·24	51·6	— 3·6	2·68	0·70	72·3	2·33
Fort Vermilion	—1·86	35·5	—58·5	0·30	0·30	53·2	1·71

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SOME Weather Observations taken at Central Experimental Farm, Ottawa, as compared with those at Fort Vermilion, Peace River District, Alberta—*Con.*

JANUARY.

	Mean Temperature.	Highest Temperature.	Lowest Temperature.	Total Precipitation.	Heaviest in 24 hours.	Total Sunshine.	Average Sunshine per day.
	°	°	°				
Ottawa	2·24	36·4	—26·2	2·60	0·95	119·1	3·84
Fort Vermilion	—11·54	26·9	—58·0	0·20	0·07	51·4	1·65

FEBRUARY.

Ottawa	12·04	35·4	—24.0	3·04	1·30	141 2	4·86
Fort Vermilion	1.56	35·0	—48·0	0·32	0·10	88·3	3·04

MARCH.

Ottawa	19·34	44·0	—17·0	1·42	0·75	211·0	6·80
Fort Vermilion	10·57	54·5	—38·0	0·05	0·02	197·7	6·37

RECORD of Sunshine at Fort Vermilion, Peace River District, Alberta, from April 1, 1911, to March 31, 1912.

Month.	Number of days with sunshine.	Number of days without sunshine.	Total hours sunshine.	Average sunshine per day.
April	27	3	175·3	5·84
May	28	3	233·9	7·54
June	27	3	217·6	7·25
July	30	1	264·0	8·51
August	28	3	214·1	6·90
September	27	3	165·7	5·52
October	28	3	141·2	4·55
November	21	9	88·2	2·94
December	16	15	53·2	1·71
January	17	14	51·4	1·65
February	17	12	83·3	3·04
March	30	1	197·7	6·37

(Signed) WILLIAM T. ELLIS,
Observer.

NOTE.—The records for Fort Vermilion are taken by Mr. Jones, of the Experimental Station there, and the tables therefrom are prepared by Mr. Wm. Ellis, Weather Observer, Central Farm.

METEOROLOGICAL OBSERVATIONS.

TABLE of Meteorological Observations taken at the Central Experimental Farm, Ottawa, from April 1, 1911, to March 31, 1912, giving maximum, minimum, and mean temperature for each month with date of occurrence; also, the rainfall, snowfall and total precipitation.

Month.	Maximum.	Minimum.	Range.	Mean.	Highest.	Date.	Lowest.	Date.	Rainfall.	Snowfall.	Total Precipitation.	Number of Days of Precipitation.	Heaviest in 24 Hours.	Date.
	°	°	°	°	°		°							
April	50·29	28·59	21·70	39·44	81·2	29th	3·6	4th	1·07	4·00	1·47	8	0·60	5th.
May	76·14	49·82	26·32	62·98	93·9	22nd	21·0	4th	2·80	.....	2·80	10	0·97	24th.
June	74·75	54·50	20·24	64·62	88·0	27th	45·4	24th	3·64	.....	3·64	15	1·48	12th.
July	84·02	58·91	25·10	71·46	97·8	3rd	48·0	27th	2·79	.....	2·79	14	1·08	2nd.
August	82·73	57·90	24·83	70·31	97·6	1st	42·6	30th	1·47	.....	1·47	11	0 64	27th·
September	67·57	46·24	21·33	56·90	80·8	1st	28·8	14th	2·98	.....	2·98	16	0·93	15th.
October	56·46	37·88	18·58	47·14	72·0	4th	23·6	28th	2·13	S	2·13	11	0·93	4th.
November	37·13	23·51	13·85	30·43	60·0	12th	5·8	17th	1·73	12·00	2·93	16	0·58	24th.
December	31·84	20·65	11·19	26·21	51·6	11th	—3·6	20th	1·31	13·75	2·68	13	0·70	15th.
January	10·71	-6·23	16·95	2·24	36·4	19th	—26·2	13th	0·11	25·00	2·60	16	0·95	9th.
February	20·98	3·11	17·87	12·04	35·4	17 & 18th	—24·0	10th	0·07	29·75	3·04	8	1·30	22nd.
March	29·99	8·70	21·29	19·34	44·0	29th	—17·0	6th	0·02	14·00	1·42	11	0·75	15th.
									20·12	98·50	29·95	149		

Rain or snow fell on 149 days during the 12 months.
Heaviest rainfall in 24 hours, 1·48 inches on June 12.
Heaviest snowfall in 24 hours, 13·00 inches on February 22.
The highest temperature during the 12 months was 97°·8 on July 3.
The lowest temperature during the 12 months was — 26·2° on January 13.

During the growing season rain fell on 8 days in April, 10 days in May, 15 days in June, 14 days in July, 11 days in August, and 16 days in September.

April and February show the lowest numbers of days with precipitation, viz., 8 each.

Total precipitation during the 12 months 29·95 inches, as compared with 27·71 inches during 1910-11.

RAINFALL, Snowfall and Total Precipitation from 1890 to 1911-12, also the average annual amount that has fallen.

Year.	Rainfall.	Snowfall.	Total Precipitation.
1890	24·73	64·85	31·22
1891	30·19	73·50	37·54
1892	23·78	105·00	34·28
1893	31·79	72·50	39·04
1894	23·05	71·50	30·20
1895	27·01	87·50	35·76
1896	21·53	99·75	31·50
1897	24·18	89·00	33·08
1898	24·75	112·25	35.97
1899	33·86	77·25	41·63
1900	29·48	108·00	40·72
1901	29·21	97·25	38·91
1902	25·94	101·75	36·10
1103	26·43	85·00	34·92
9904	25·95	108·75	36·79
1905	23·71	87·25	32·42
1906 January 1 to March 31	1·90	24·50	4·34
1906–07	21·73	72·50	28·94
1907–08	24·70	134·75	38·18
1908–09	22·13	107·90	32·91
1909–10	28·40	61·25	34·51
1910–11	18·94	88·25	27·72
1911–12	20·12	98·50	29·95
Total for 22 years and 3 months	563·51	2,028·75	766·63
Average for 22 years	25·61	92·21	34·84

RECORD of Sunshine at the Central Experimental Farm, Ottawa, from April 1, 1911, to March 31, 1912.

Months.	Number of days with Sunshine.	Number of days without Sunshine.	Total hours Sunshine.	Average Sunshine per day.
April	29	1	257·4	8·58
May	30	1	279·8	9·02
June	26	4	233·1	7·77
July	30	1	326 7	10·53
August	31	0	278·7	8·99
September	25	5	210·1	7·00
October	25	6	152.1	4 90
November	21	9	81·0	2·70
December	17	14	72·3	2·33
January	23	8	119·1	3 84
February	26	3	141·2	4·86
March	29	2	211·0	6·80

(Signed), WILLIAM T. ELLIS,
Observer.

REPORT OF EXPERIMENTS ON THE FRUIT FARM OF THOS. A. SHARPE, SALMON ARM, B.C.

SALMON ARM, March 31, 1912.

The Director,
Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit this, my first report on the experimental work done on this farm.

The clearing of the land was begun in the spring of 1905 and has been carried on slowly until the present time. I have now about 30 acres under cultivation.

Most of the land in this locality had been burned over some years ago, and a young growth of birch, fir and spruce has since grown up, but the soil is lacking in humus, the surface having been burned off, and I am trying to remedy this condition by sowing clover and adopting a short rotation.

Owing to the fact that the rainfall here is usually light, a plentiful supply of vegetable matter is necessary in the soil to ensure a vigorous growth of fruit trees or in fact of any crop and, as clover and alfalfa do very well in this locality, even on new land, it will be a comparatively easy task to put the land in first-class condition to grow fruit trees.

The first five acres cleared was sown with 15 lbs. per acre of red clover in the spring of 1907 and turned under in the same year. The land was got ready for fruit trees, and quite a collection of desirable varieties were planted in the spring of 1908. Owing to my inability to spend more than a day or two on the farm each summer, and as the men I employed were not fruit-growers, the orchard planted in the spring of 1908 did not make as much progress as could have been attained with greater care, but most of the trees have made a fair, healthy growth. The following varieties fruited this year: Brewington Pippin, Burlington, Green Newtown Pippin, Higby

Sweet, Baxter, Jonathan, Longfield, Magnet, Major, Jewett's Best, McIntosh Red, Norton's Melon, Newtown Spitzenburg and Standard. Several of these are new to this district and more time is required to form an opinion as to their merits but the following are promising: Jewett's Best, Magnet, Baxter and Longfield.

The following is a list of the varieties of apples planted in the spring of 1908, most of which had been tested on the Experimental Farm at Agassiz and were selected because of probable value in this district: Ailes, Baltimore, Baxter, Beauty of Bath, Bethlemite, Boyd, Brewington Pippin, Burlington, Canada Red, Cannon Pearmain, Cox Orange Pippin, Cranberry Pippin, Cullasaga, Ferris, Green Newtown Pippin, Grimes' Golden, Higby Sweet, Ira, Jersey Sweet, Jewett's Best, Jonathan, Julian, Magnet, Major, McIntosh Red, McLellan, Minister, Mother, Newtown Spitzenburg, Norton's Melon, Orenco, Longfield, Lady Sweet, Picket, Piedmont, Pippin, Porter, Shiawassee Beauty, Swayzie Pomme Gris, Scarlet Pippin, Stanard, Spitzenburg, White Pippin, White Winter Pearmain, Winter Banana, Yellow Newtown Pippin—forty-six varieties in all. In addition, forty-one varieties were planted in the spring of 1911, most of which have made a satisfactory growth.

PEARS.

In the experimental pear orchard there are thirty-four varieties planted and doing well. A few trees planted in the spring of 1908 have all done well, and the Dr. Jules Guyot bore a few specimens of fruit in 1911. This variety is quite promising for this district.

There are also a number of varieties in the nursery, to be planted the coming season.

CHERRIES.

Three varieties of cherries were planted in the spring of 1908, and these fruited in 1910 and bore a fine crop in 1911. The varieties are: Olivet, de Planchoury, and Von der Natte. Several additional varieties have been ordered for planting this spring.

PLUMS.

Three varieties of plums have been planted in an orchard and several sorts are in the nursery. Several varieties have been ordered for this season's planting.

BERRIES.

Three varieties of blackberries were planted in the spring of 1908, namely: Eldorado, Snyder, and Stone's Hardy. All of these have fruited, and stand the climate. The Eldorado is the most productive and bears the finest fruit.

METEOROLOGICAL RECORDS.

As the instruments were not all received at the same time, the record of sunshine commences May 13, and that for temperature and precipitation on July 1.

Month.	Highest Temperature Degrees.		Lowest Temperature Degrees.		Rainfall.	Snowfall.	Sunshine.
1911.	Date.	Temp.	Date.	Temp.	In.	In.	Hrs. Min.
April							
May 13th to 31st							151-36
June							296-12
July	16 & 25	96½	12th	43	1·84		319-00
August	18th	89	28th	41	1·14		265-00
September	1 & 2	85	25th	26	1·20		149-12
October	7th	76	28th	19	·1		164-42
November	4th	47	12th	1	1·95	20·5	61-42
December	1st	40	31st	—5	1·5	23·5	30-12
1912.							
January	25th	46	2nd	—15	1·86	9·0	43-42
February	14 & 19	44	29th	2	·47	3·0	67-42
March	13th	62	3rd	3	·22		229-00
					9·99	56·0	1,808-00

Taking ten inches of snow as equivalent to one inch of rainfall, the total precipitation for the period during which a record was kept was 15·59 inches.

I have the honour to be, sir,
Your obedient servant,

THOS. A. SHARPE,

EXPERIMENTS IN HORTICULTURE AT ATHABASKA LANDING.

Arrangements were made this season with Archdeacon Robins of Athabaska Landing to carry on some experiments in horticulture for the Department, at his home at that point. Following will be found his report on the season's results.

The work will be continued there during the coming season.

ATHABASKA LANDING, ALBERTA, March 31, 1912.

The DIRECTOR,
Dominion Experimental Farms,
Ottawa, Ontario.

SIR,—I have the honour to report as follows on the experiments in horticulture conducted at Athabaska Landing during the year 1911-12.

GENERAL REMARKS.

Snow disappeared during the first ten days of April. A long spell of cold weather followed, the sun was hot but cold nights kept the frost in the ground to such an extent that ploughing and digging were not possible until the latter end of the month.

May was a month satisfactory for garden work, also the early part of June; then followed one of the wettest summers on record.

TREES AND SHRUBS.

These suffered badly in transit. The packing of them was satisfactory, but the delay in procuring them from Edmonton was so long and the season so frosty that when they were delivered on May 25, all were badly frozen and appeared to be dead.

The ground had been carefully prepared and all were treated with regard, but a dry spell of a few weeks followed by the maintained wet weather to which reference has been made, seemed to make recovery impossible for the majority. Constant care was bestowed on them all, the apparently dead as well as those showing signs of vitality, but the bush fruits exhibited no response, while the plums were very languid and only a few apples maintained evidence of life until the end of the season.

My conclusion was that none of them had a fair trial for the reasons above stated, and some may yet prove living and encouraging.

Every tree and shrub received careful marking as to location, thus affording opportunity for observation in the opening season.

Plans indicating the arrangement accompany this report.

Amongst apples, Yellow Transparent gave the strongest sign of life, and of the shrubs the Syringas and Ampelopsis.

I am of the opinion that no final conclusions can be drawn from the tests of one short season, especially such as that experienced. I purpose taking advantage of every indication of promising character in this next spring and summer.

FLOWERS.

I had no means of forcing the less hardy sorts, and the weather conditions demanded this. The results were not discouraging if this be kept in mind.

Poppy (Shirley), flowered freely on a southern border.

Mignonette in a similar situation did fairly.

Verbena (sown in open border), flowered well.

Sweet Peas grew moderately, but scarcely flowered at all.

Asters and Pansies had not time to produce flowers but were promising well.

A sharp frost of about ten degress in the third week of August arrested many promising signs and made recovery for some plants impossible.

My conclusions with flowers were that with glass to assist the more tender sorts, which could be planted out about the end of May, together with the hardy annuals sown direct in their flowering quarters, no difficulty of serious consideration would be experienced.

VEGETABLES.

These form the most important part of human requirements in this Northland, so far as the garden is concerned. I was greatly encouraged with almost everything I tested; some of them grew abnormally.

The seeds were not put in new freshly-broken ground, but in a fine open soil, probably part of the old bed of the river Athabaska. Hoeing and weeding were diligently attended to, but no artificial watering or chemical manuring was done. A light dressing of stable manure was applied when the ground was prepared after the frost left it, but not of as short and mellowed a sort as I should have used had it been obtainable.

Radishes and turnips grew marvellously. The cutworm and turnip fly gave great trouble in the neighbourhood, but I had no serious difficulty excepting when cabbages were maturing, when cutworms began to appear.

Corn (Early Malakoff) did well until the beard began to show, when the early frost to which I have referred, stopped all its growth.

Peas (English Wonder and American Wonder) yielded equally and moderately, Cleveland's First and Best did well, while Large Pod Alaska gave splendid results. McLean's Advancer was moderate.

Beans.—Both Challenge Black Wax and Stringless Green Pod were promising abundantly, the small beans hanging in large profusion, when the sharp August frost cut them down.

Beets did exceedingly well, the Early Blood Red Turnip being more useful for kitchen use than the Egyptian Dark Red Flat.

Onion.—Large Red Wethersfield and Danvers' Yellow Globe did well in germinating, were excellent in the spring, but did not grow to any appreciable size, and failed to keep well. Probably onions will respond better if planted in small sets, these having been kept from former years.

Carrots.—French Horn grew better than Half Long Chantenay, but both gave a satisfactory yield.

Rhubarb.—Seed Victoria grew to about three small leaves which I shall watch in coming season. I sowed the seed in permanent position.

Lettuce.—All four varieties did wonderfully, the Grand Rapids being rather less satisfactory. Wheeler's Tom Thumb took a fresh lease of life after the frost, and went on producing until the severity of winter cut them.

Celery.—This failed from want of early facilities. To test the possibility, I sowed direct into the row, and obtained abundance of small plants.

I think there need be no hesitation as to maturing a crop if the seed be brought on indoors.

Cauliflower.—Extra Selected Early Erfurt Dwarf; this failed after the seed had germinated moderately.

Cabbage.—Grew freely and produced good results in abundance. The cutworm gave trouble, but not until the heads were ripe or mostly so.

Cucumber.—Evidently from the attempts the seed sown in the open made, these may be produced by use of glass.

Tomato.—Flowered and fruited freely in open until fruit was about one inch in diameter, when the frost destroyed them.

Squash.—The seeds were put in rows, on the same large heap of rotting manure covered with several inches of mellow soil. They grew so vigorously that it become impossible to tell one sort from another. All seemed to flourish and produced quantities of squash until the frost occurred. There had not been time for any to attain large growth, but they were delicious as a vegetable.

I used some other seeds besides those supplied from the Dominion Farm, such as Spinach (Sutton's Round) with results quite favourable.

Potatoes from local supplies, un-named, were planted rather too close for the wet weather, but were not disappointing.

GENERAL CONCLUSIONS.

With a more normal year and the use of glass for forcing half-hardy seeds, I anticipate excellent results with all seeds of vegetables such as are commonly used for household purposes.

As it was I provided some of the vegetables exhibited in Edmonton from this place, the exhibit obtaining the first prize.

The same remarks may be made of flowers in their future possibilities. I do not think it at all unlikely that dwarf fruit trees, apple, plum, and pear, of hardy type, will mature in the course of time. Bush fruits, currants, gooseberries and raspberries will, I think, do splendidly.

Suitable time for sowing.—May 15 to May 20.

Winter storing crops were lifted at end of September.

ARRANGEMENT OF APPLE AND OTHER TREES.

SOUTH.

Apples:	Wealthy. *		Wealthy. *		Antonovka. *		No. 1 from Russia. *		No. 1 from Russia. *
	† Gooseberry. † Lorne. †		† Greenfield's. † Red Currant. †		† Red Dutch. † Currant. †		† Victoria. † Black Currant. †		
Apples:	Mecca. *		Mecca. *		Rideau. *		Fairfield. *		Fairfield. *
	† Gooseberry. † Smith's. † Improved.		† Victoria. † Red. † Currant.		† Rankin's. † Red. † Currant.		† Saunder's. † Black. † Currant.		
Apples:	Samson. *		Samson. *		Robin. *		Lisgar. *		Lisgar. *
	† Gooseberry. † Houghton & † Broom.		† Gooseberry. † Ruth. †		† Large. † White. † Currant.		† Magnus. † Black. † Currant.		
Plums:	Prunus. *		Tomentosa. *		Plum. *		*		*
	† Gooseberry. † Greenfield. †		† Gooseberry. † 10-48. † Seeding.		† White. † Grape. † Currant.		† Collins. † Prolific. † Black Currant.		
Plums:	Carstersen's Early. *		Plum. *		Prunus. *		Tomentosa. *		Carstersen's Early. *

EAST. WEST.

NORTH.

I have the honour to be, sir,
Your obedient servant,
(Sgd.) E. F. ROBINS.

EXPERIMENTAL WORK AT KAMLOOPS, B.C.

The winter of 1910-11 and the spring following were remarkable, even in this very dry district, for the almost complete lack of precipitation. As a result, the land was so dry when the time for spring seeding arrived that it was considered useless to sow spring grains.

In the fall of 1910, the land was ploughed and left in good shape to absorb snow water during the spring of 1911, when it was cultivated as soon as dry enough, the work being continued until a complete dust blanket had been formed. This was repeated during the summer, especially after any rain heavy enough to form a crust.

On August 29 and 30, four acres were seeded with Kharkov wheat, at the rate of two bushels per acre. This came up well, and although early frosts did not allow it to make a great deal of growth in the fall, it went into the winter of 1911-12 looking healthy, and at the time of writing, March 31, 1912, it appears to have wintered well.

Of the thirty-one varieties of apple trees planted in 1910, some have proved unsuitable to the Kamloops district and will be replaced by other sorts. The remainder have, so far, done fairly well.

Mr. E. W. Calhoun, under whose supervision the experiments at Kamloops have been carried on, having resigned his position as superintendent of the Harper ranch at that point, the work will be carried on by his successor in the latter position, Mr. Lionel F. Stobart.

EXPERIMENTS AT FORTS SMITH, RESOLUTION AND PROVIDENCE.

These are Hudson's Bay Company posts, the first being situated on Slave River, about half-way between Lake Athabaska and Great Slave Lake. Fort Resolution is on the south shore of Great Slave Lake, and Fort Providence lies a short distance to the northwest of the western end of that lake, on the Mackenzie River.

A Mission for the Indians of the surrounding district is located at each fort, and the fathers in charge attempted, during the season of 1911, to test some varieties of cereals and vegetables sent them by the Department of Agriculture.

At Fort Smith, the season was very cold and backward, frost occurring on July 24. August also was very wet and cold during the whole month.

At Fort Resolution, lack of moisture during the growing season affected all crops, and the same conditions obtained at Fort Providence.

Many of the seeds sent did not germinate at any of these points, and of those which did, most did not mature or gave very light crops. It has been decided to discontinue the experimental work for the present in the above localities.

BEAVER LODGE, GRANDE PRAIRIE, ALBERTA.

Arrangements have been made with Mr. S. J. Webb, of Beaver Lodge, Grande Prairie, Alberta, to carry on some experimental work for the Department, on his farm at that point. Records of temperatures will also be kept.

GROUARD, ALBERTA

Similar arrangements have been made with the Rev. Father Laurent, who has charge of the Mission at Grouard, on the Lesser Slave Lake.

NEW EXPERIMENTAL STATIONS.

STE. ANNE DE LA POCATIERE, QUE.

Work on the Experimental Station at this place was of a preparatory rather than of an experimental character during the past season. Mr. Georges Hudon, dit Beaulieu, was appointed foreman in charge of farming operations. The crops grown and methods followed were practically the same as in former years on these farms. The only work carried on that might be considered of an experimental or demonstrational character was the growing of a few acres of Indian corn. This was highly successful, a good yield of excellent forage being secured off a moderately well-manured field, given fair treatment as to cultivation and care.

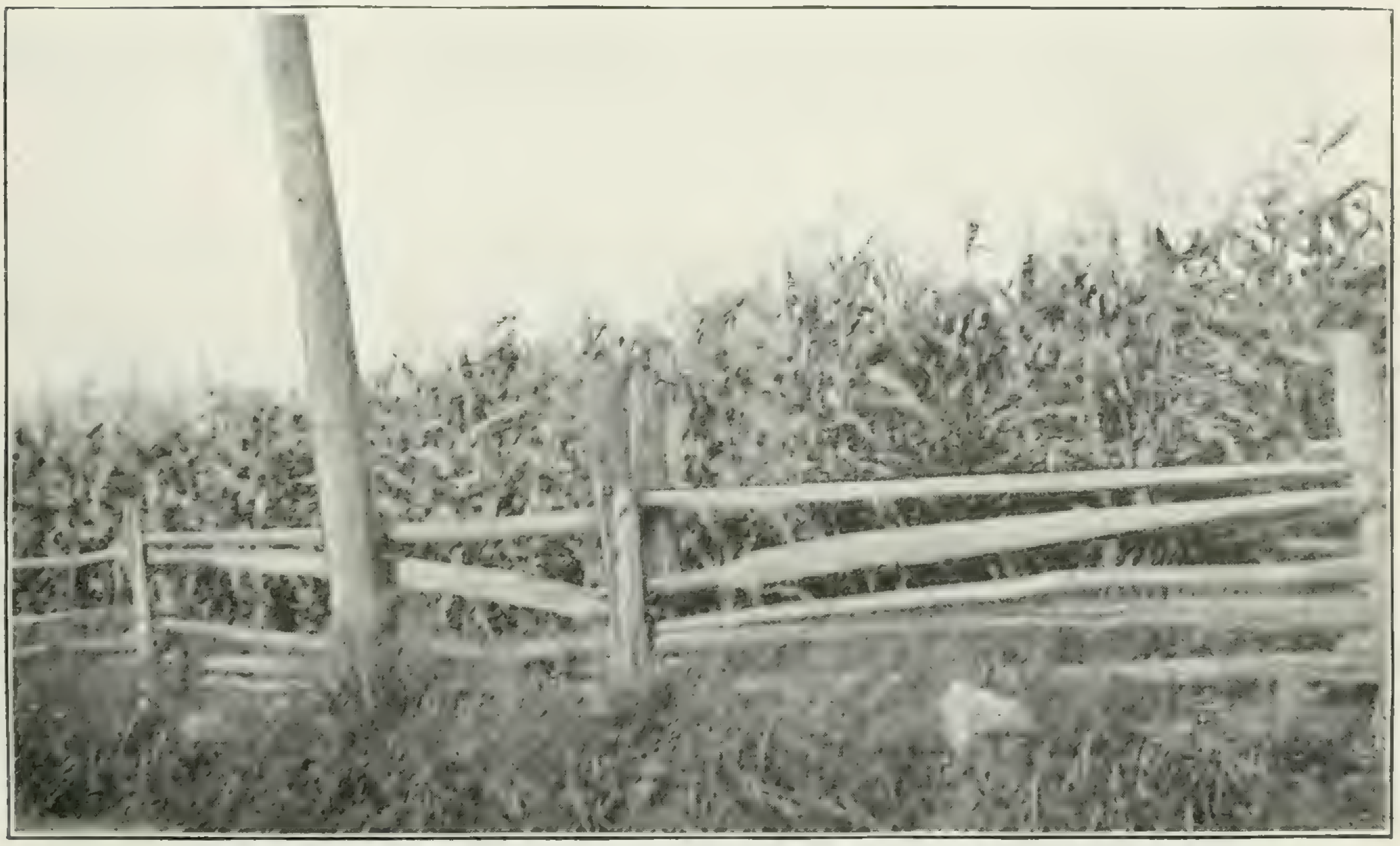
Preparations were made for the beginning of regular operations in the season of 1912. Some necessary clearing of land was done and a large quantity of fencing material in the way of posts purchased and landed on the farm. A superintendent has not yet been appointed.

EXPERIMENTAL STATION AT KENTVILLE, N.S.

During the past season, about thirty acres of land was logged, stumped and broken on this farm. It is now in shape to be planted out to apple trees. In addition to the area mentioned, about one hundred acres more was logged as far as necessary and brushed preparatory to burning and stumping next summer.



Clearing land on Experimental Station, Kentville, N.S.



Indian Corn at Experimental Station, Ste Anne de la Pocatière, Que.

During the winter months, a large quantity of lumber, about 175,000 board feet, has been made off the farm. This lumber is to be used in the erection of houses for the superintendent and foreman, a barn for horses and cattle, a small office building and in repairing and remodelling an old house which was on the property when bought. This is to be converted into a double house, to accommodate the herdsman and the horticultural foreman or gardener.

EXPERIMENTAL STATION AT INVERMERE, B.C.

This land, acquired in 1910, has been cleared and broken ready for a crop in 1912. To the 35 acres originally acquired by the Department, 18 acres rough hillside and bottom land has been added. This additional land, while of small value at the present time, may eventually be found useful for some special lines of work with fruits or vegetables.

EXPERIMENTAL STATION AT SIDNEY, B.C.

In the summer of 1911, a farm offered to the Dominion Government by the British Columbia Electric Company, for Experimental Farm purposes, near Sidney, Saanich Peninsula, Vancouver Island, B.C., was visited by myself. This property was purchased by the Department in February, 1912. It is about 125 acres in extent and lies 16 miles north of Victoria and about one mile south of Sidney on the line of the British Columbia Electric, which divides it transversely into two nearly equal areas. The land rises gradually from the straits on which it fronts, to a point some few hundred feet west of or beyond the Victoria-Sidney road. In addition to the British Columbia Electric and the highway above mentioned, the farm is crossed by a railroad running from Victoria to Sidney. These three roads divide the property into four approximately equal parts.

The soil is, for the most part, loamy, verging in some parts to clay and in others to sand or light sandy loam. It will require drainage over a very large proportion of its area, and only a small part of the farm is in fit shape for cultivation on account of forest or stump and stone.

CROP ROTATION.

The important question of crop rotation has received considerable attention recently both at Ottawa and at some of the branch Farms.

By 'Crop Rotation,' 'Cropping System,' 'Course,' and numerous other expressions, is meant a certain sequence in crops which regularly repeats itself each time a series of crops is run. It really implies, further, that the crops follow each other in such order as to insure to each supplies of plant food suitable in quantity and character to produce the best returns from each crop grown. Hence, in arranging a rotation, it is very necessary to have some knowledge of the food requirements, and to know something of the values of the residues, of the different crops included.

Certain forage crops, such as corn, roots, potatoes and hay, require an immense amount of food suitable for stem, leaf and root production. This food is known as nitrates and is furnished by clover and other sod turned down, and in well-manured land. Other crops, such as cereals, can thrive with a lighter supply of nitrates, but need more phosphates, hence do well after some forage crop has taken up the superabundance of nitrates found after sod. It is evident, therefore, that a good rotation will include (1) meadow or pasture, (2) roots or corn, (3) some cereal crop.

Various combinations of these three groups are possible. Certain combinations are likely to give good results under conditions as they exist in the eastern provinces. Certain other combinations of these groups, with, possibly, the necessary inclusion of

a summer-fallow year in the course, are likely to prove satisfactory under climatic conditions as they exist in the prairie provinces.

A large number of combinations or rotations have been thought out and put under test in both the east and west. Below follows a list of those already under way for one year or longer.

CENTRAL FARM, EASTERN BRANCH FARMS OF STATIONS, AND B. C. BRANCH FARM.

Name.	Duration.	Description.	Location.	Remarks.
A.	5 years.....	Oats, corn, oats seeded down, clover hay, hay or pasture.	Ottawa, Charlottetown, Cap Rouge.	Land ploughed August 5th year, 10 lbs clover per acre for fertilizer first year, seeded red clover 8, alsike 2, timothy 10 lbs, 3rd year two crops hay expected 4th year.
B.	5 "	Grain seeded down, clover hay, corn, grain seeded down, clover hay.	Ottawa, Charlottetown, Cap Rouge, Nappan.	Seeded down 1st and 4th years, red clover 10, alsike 2, timothy 5 lbs.
C.	4 "	Hoed crop, grain seeded down, hay or pasture.	Ottawa, Charlottetown, Cap Rouge, Nappan, Kentville, Agassiz.	Hoed crop manured 20 tons per acre, seeded down red clover 10, alsike 2, timothy 12.
D.	3 "	Hoed crop, grain seeded down, hay.	Ottawa, Charlottetown, Cap Rouge, Nappan.	Manured 15 tons per acre, seeded down, alfalfa 12, red clover 6, timothy 6.
E.	3 "	Hoed crop, grain seeded down, pasture (cattle, sheep or swine.)	Ottawa.....	Same as D.
F.	1 "	Hoed crop, grain seeded down, clover hay, grain seeded to clover.	Charlottetown	Seeded clover 10, timothy 6, 2nd year; 4th year seeded 10 lbs. clover for fertilizer.
G.	7 "	Oats, hoed crop, wheat (seeded down), clover hay, timothy hay, pasture, pasture.	Charlottetown	Seeded red clover 8, alsike 2, timothy 12, 7th year fall-ploughed.
H.	3 "	Roots, grain seeded down, pasture (swine).	Ottawa.....	Same as D.
I.	6 "	Hoed crop, grain, hay, hay, pasture, grain.	Cap Rouge.....	20 tons manure per acre.
J.	6 "	Hoed crop, grain, hay, pasture, grain, hay.	Cap Rouge.....	24 tons manure per acre.
K.	6 "	Hoed crop, grain hay, hay pasture, pasture.	Cap Rouge.....	24 tons manure per acre.
N.	4 "	Hoed crop, grain, hay, pasture.	Ottawa.....	No manure or fertilizer of any kind used, seeded red clover 10, alsike 2, timothy 12.
P.	4 "	Hoed crop, grain seeded down, clover hay, timothy hay.	Ottawa.....	Deep ploughing, fourth year, plough August 7 in. deep, work with cultivator at intervals; land ploughed again late fall 7 in., manure 20 tons per acre.
R.	3 "	Hoed crop, grain, hay.	Ottawa	Seeded, alfalfa 12, red clover 6, timothy 6, all crops used for soiling, manure 15 tons per acre.
S.	4 "	Same as P.	Ottawa.....	Shallow ploughing, deep cultivation by stiff-toothed cultivator or subsoiler, seeded 10 lbs. red clover, 12 lbs. timothy per acre; fourth year, plough August, 4 in. deep; work at intervals, ridge up in fall; manure 20 tons per acre.
X.	4 "	Hoed crop, grain, hay, hay.	Ottawa.....	Barnyard manure, 15 tons per acre first year. Seeded red clover 10, alsike 2, timothy 12.
Y.	4 "	Same as X.	Ottawa.....	No barnyard manure ; 100 lbs. nitrate of soda per acre each spring ; 75 lbs. muriate of potash, and 300 lbs. super-phosphate additional when in hoed crop.
Z.	4 "	Hoed crop, grain, hay, hay.	Ottawa.....	7½ tons barnyard manure per acre 1st year; 100 lbs. nitrate of soda each year; 37½ lbs. muriate of potash and 150 lbs. superphosphate additional when in hoed crop.

PRAIRIE FARMS.

Name.	Duration.	Description.	Location.	Remarks.
A.	1 year.....	Wheat each year.....	All prairie farms..	
B.	2 years.....	Summer-fallow, wheat, (fall wheat.)	Lethbridge.	
C.	3 years.....	Summer-fallow, wheat, wheat or coarse grain.	Indian Head, Rosthern, Scott, Lacombe, Lethbridge.	Spring or fall wheat, to be used according to location.
D.	4 years.....	Wheat, wheat, oats or barley, summer-fallow.	Brandon.....	Manure applied on stubble of second year wheat, ploughed in in autumn.
E.	4 years.....	Same as D	"	No manure at any time.
F.	5 years.....	Wheat, wheat, corn, oats or barley seeded down, clover hay.	"	Meadow ploughed as soon as possible after hay harvest and worked rest of season. Seeded red clover 8, timothy 3, rye grass 4.
G.	6 years.....	Wheat, wheat, oats or barley seeded down, clover hay, pasture, corn.	"	Pasture ploughed late in summer and well worked. Corn stubble, merely cultivated, not ploughed before sowing to wheat. Seeded, red clover 8, timothy 5.
H.	6 years.....	Wheat, wheat, summer-fallow, oats seeded down, clover hay, pasture.	"	Pasture manured in mid-summer, ploughed and well cultivated during fall. Seeded rye grass 8, red clover 6, alsike 2.
I.	6 years.....	Flax, oats, summer-fallow, wheat seeded down, clover hay, pasture.	"	Seeded western rye 8, red clover 6, alsike 2.
J.	6 years.....	Summer-fallow, wheat, wheat, oats seeded down, hay, pasture.	Indian Head, Rosthern, Scott.	Seeded rye grass, red clover, alfalfa.
K.	6 years.....	Hoed crop, wheat, oats seeded down, hay, pasture, pasture.	Lacombe.....	Manured on first year hay stubble. Ploughed in July, second year pasture.
L.	6 years.....	Hay, pasture, pasture, wheat, oats, barley seeded down.	"	Seeded timothy 4, alsike 4, red clover 4.
M.	6 years.....	Summer-fallow, wheat, oats, summer-fallow, peas and oats for hay, barley or oats.	Lethbridge	
N.	7 years.....	Alfalfa, alfalfa, alfalfa, alfalfa, alfalfa, grain, grain.	Lacombe	Seeded down, no nurse crop, broken after first cutting, 5th year.
O.	7 years.....	Hoed crop, wheat, oats, summer-fallow, barley, hay, pasture.	"	Seeded timothy 3, alsike 2, alfalfa 6. Last year ploughed early July.
P.	8 years.....	Fallow, wheat, wheat, fallow, corn, barley, hay, pasture.	Indian Head, Rosthern, Scott.	Fifth year crop, 15 tons manure per acre. Seeded rye grass, red clover, alfalfa.
Q.	8 years.....	Roots, wheat, hay, hay, pasture, pasture, pasture, rape.	Brandon.....	Sheep rotation. Seeded mixture grasses and clovers. Seventh year pasture, ploughed midsummer and backset.
R.	9 years.....	Fallow, hoed crop, wheat, oats, fallow, wheat, oats seeded down, hay, pasture.	Indian Head, Rosthern, Scott, Lethbridge.	Hoed crop, manured 15 tons per acre. Seeded rye grass, red clover, alfalfa.
S.	9 years.....	Fallow, hoed crop, wheat, fallow, wheat, oats, fallow, peas and oats for hay pasture.	Lethbridge.....	Manure applied on summer-fallow seventh year. Seeded to rye for pasture after hay crop harvested eighth year.
T.	10 years....	Summer-fallow, wheat, oats, fallow, seeded alfalfa, late June, alfalfa, alfalfa, alfalfa, fallow, hoed crop, wheat.	"	Alfalfa sown in rows 21 inches apart. Manure applied on wheat stubble tenth year.
U.	.....	Seeding alfalfa, alfalfa, alfalfa, alfalfa, alfalfa, hoed crop, wheat, wheat, oats.	"	Irrigated.
V.	.....	Alfalfa continously.	"	Irrigated.
W.	10 years	Wheat, wheat, corn, oats, barley, alfalfa, alfalfa, alfalfa, alfalfa, alfalfa.	Brandon..... ..	Alfalfa sown 6th year without nurse crop, alfalfa ploughed up in midsummer, 10th year.

CULTURAL PROBLEMS ON THE PRAIRIES.

On the prairies, some of the most difficult problems to solve are those having to do with breaking virgin prairie, preparatory to crop production; moisture conservation; forage crop production; conservation or increase of soil fertility and weed eradication. With a view to gaining some information as to methods of cultivation likely to give best results along the lines mentioned, the investigational work outlined below has been begun at Brandon, Indian Head, Rosthern, Scott, Lacombe and Lethbridge.

EXPERIMENT No 1.

PRAIRIE BREAKING.

1. Ploughed 3 inches to 4 inches early spring, pack, double disc, harrow, double disc, sow to peas and oats.
2. Ploughed 3 inches to 4 inches early spring, pack, double disc, harrow, double disc, sow to flax.
3. Ploughed 3 inches to 4 inches early spring, pack, double disc, harrow, sow to flax.
4. Broken early June, 4 inches to 5 inches, kept cultivated from day broken.
5. Broken early June, 2 inches to 3 inches, rolled, backset early September, kept cultivated from day broken.
6. Broken early spring 4 inches, worked and sown to fall wheat (Lethbridge only).

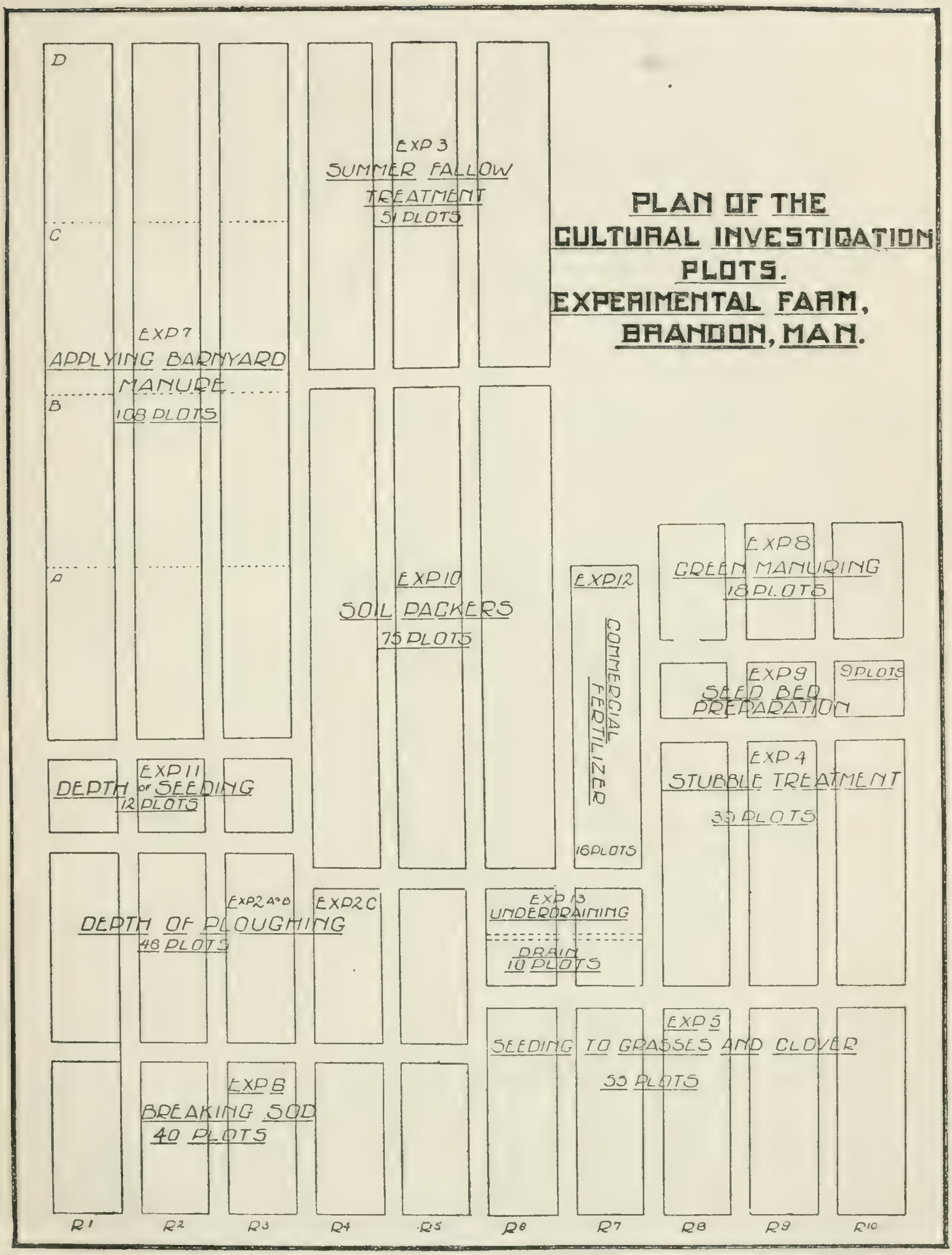
Only five plots required each year.
1st year.—To be treated as above.
2nd year.—Plots to be in wheat.
3rd year.—Plots to be in wheat.
4th year.—Summer-fallow.
5th year.—Wheat.
Experiment to be continued five years with new land each year.
Flax.—30 to 40 lbs. per acre, sow 15th to 25th May.
Peas and Oats.—1 bushel oats, 2 bushels peas per acre.

EXPERIMENT No. 2.

DEPTH OF PLOUGHING.

Ploughing on wheat stubble to be sown to oats:—

A.
1. Ploughing three (3) inches deep.
2. Ploughing four (4) inches deep.
3. Ploughing five (5) inches deep.
4. Ploughing five (5) inches deep.
5. Ploughing five (5) inches deep.
6. Ploughing five (5) inches deep.
7. Ploughing five (5) inches deep.
8. Ploughing five (5) inches deep.
9. Ploughing five (5) inches deep.
10. Ploughing five (5) inches deep.


PLAN OF THE
CULTURAL INVESTIGATION
PLOTS.
EXPERIMENTAL FARM,
BRANDON, MAN.
D
C
B
A
EXP 3
SUMMER FALLOW
TREATMENT
51 PLOTS
EXP 7
APPLYING BARNYARD
MANURE
108 PLOTS
EXP 10
SOIL PACKERS
75 PLOTS
EXP 12
COMMERCIAL
FERTILIZER
16 PLOTS
EXP 8
GREEN MANURING
18 PLOTS
EXP 9
SEED BED
PREPARATION
9 PLOTS
EXP 4
STUBBLE TREATMENT
35 PLOTS
EXP 11
DEPTH of SEEDING
12 PLOTS
EXP 2 A & B
DEPTH OF PLOUGHING
46 PLOTS
EXP 2 C
EXP 13
UNDERDRAINING
DRAIN
10 PLOTS
EXP 5
SEEDING TO GRASSES AND CLOVER
55 PLOTS
EXP 6
BREAKING SOD
40 PLOTS
R1
R2
R3
R4
R5
R6
R7
R8
R9
R10

Ploughing for summer-fallow: —

B 1. Ploughing three (3) inches deep.
2. Ploughing four (4) inches deep.
3. Ploughing five (5) inches deep.
4. Ploughing six (6) inches deep.
5. Ploughing seven (7) inches deep.
6. Ploughing eight (8) inches deep.
7. Ploughing five (5) inches deep, subsoil 4 inches.
8. Ploughing six (6) inches deep, subsoil 4 inches.
9. Ploughing seven (7) inches deep, subsoil 4 inches.
10. Ploughing eight (8) inches deep, subsoil 4 inches.

On sod:—

C 11. Ploughing three (3) inches deep sod and stubble.
12. Ploughing four (4) inches deep sod and stubble.
13. Ploughing five (5) inches deep sod and stubble.
14. Ploughing three (3) inches deep on sod and 6 inches deep fall or spring after wheat.

On plots 1 to 10 a three-year rotation is to be followed.

1st year.—Summer-fallow.
2nd year.—Wheat, plough late September.
3rd year.—Oats, disc early autumn.

In this way, plot 1 is ploughed 3 inches deep as summer-fallow and 3 inches deep as stubble; plot No. 2, 4 inches deep as summer-fallow and 4 inches deep as stubble; plot No. 5, 7 inches deep as summer-fallow and 5 inches deep as stubble. In cases of all other plots stubble is ploughed 5 inches deep.

On plots 11, 12, 13 and 14, a four-year rotation is to be followed.

1st year.—Wheat. Ploughed fall or spring same depth as when ploughed from sod, except plot 14.

2nd year.—Oats. Seeded down rye grass 5 lbs., timothy 5 lbs., red clover 5 lbs., alfalfa, 5 lbs.

3rd year.—Hay.

4th year.—Hay. Plough right after hay is cut, cultivate rest of season to insure rotting of sod.

For this work, 30 plots are required for summer-fallow and stubble ploughing and 16 plots for sod ploughing, or 46 plots in all.

On plots 1 to 10, manure 6 tons per acre on wheat stubble, early fall.

On plots 11, 12, 13 and 14, manure 8 tons per acre autumn, first year in hay.

EXPERIMENT No. 3.

SUMMER-FALLOW TREATMENT.

1. Plough 4 inches June, pack if necessary and practicable, cultivate as necessary.
2. Plough 6 inches June, pack if necessary and practicable, cultivate as necessary.
3. Plough 8 inches June, pack if necessary and practicable, cultivate as necessary.
4. Plough 4 inches June, cultivate; plough 4 inches September, harrow.
5. Plough 6 inches June, cultivate; plough 6 inches September, harrow.
6. Plough 8 inches June, cultivate; plough 8 inches September, harrow.
7. Plough 6 inches June, cultivate; plough 4 inches September, harrow.
8. Plough 4 inches June, cultivate; plough 6 inches September, harrow.

9. Plough 4 inches June, early as possible, cultivate; plough 6 inches September, leave untouched.

10. Plough 5 inches June, seed to rape or other green forage crop and pasture off.

11. Plough 6 inches May 15, harrow and pack if necessary, cultivate as necessary.

12. Plough 6 inches June 15, harrow and pack if necessary, cultivate as necessary.

13. Plough 6 inches July 15, harrow and pack if necessary, cultivate as necessary.

14. Fall cultivate before summer-fallowing. Plough 6 inches June, harrow and pack if necessary, cultivate as necessary.

15. Fall plough 4 inches before summer-fallowing. Plough 6 inches June, harrow and pack if necessary, cultivate as necessary.

16. Plough 6 inches June, pack, cultivate as necessary.

17. Plough 6 inches June, no packing, otherwise same as other plots.

For this work, three groups of 17 plots each are required. A three-year rotation is followed.

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Oats.

Plough as early in June as possible, excepting plots 11, 12 and 13.

Apply 6 tons manure per acre on first year stubble in early fall.

EXPERIMENT No. 4.

STUBBLE TREATMENT.

Wheat Stubble and Sowing to Wheat.

1. Plough—Autumn.
2. Disc harrow—Autumn.
3. Burn stubble, then disc—Autumn.
4. Burn stubble, then plough—Autumn.
5. Burn stubble in spring—Seed at once.
6. Plough in spring—Seed at once.
7. Disc at cutting time—Spring plough.
8. Disc at cutting time—Autumn plough.
9. Plough autumn—Subsurface pack at once.
10. Plough spring—Seed—Subsurface pack.

Wheat Stubble but Sowing to Oats.

11. Plough autumn—Subsurface pack at once.
12. Plough spring—Seed—Subsurface pack.
13. Cultivate autumn—Spring plough—Seed.

In each case such additional cultivation before seeding to be given in spring as may seem necessary to prepare a good seed bed. Packer not to be used except where mentioned.

This line of experiments requires 39 plots. A three-year rotation is followed:

1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat—plots 1 to 10.
Oats—plots 11 to 13.

All summer-fallow ploughing to be 6 inches deep early in June.

Ploughing stubble for wheat 4 inches in fall and 4 inches in spring.

Ploughing stubble for oats 5 inches in fall and 5 inches in spring.

EXPERIMENT No. 5.

SEEDING TO GRASS AND CLOVER.

1. Seeding rye grass 10 lbs. and red clover 10 lbs. with nurse crop on summer-fallow.
2. Seeding rye grass 10 lbs. and red clover 10 lbs. alone after summer-fallow.
3. Seeding rye grass 10 lbs. and red clover 10 lbs. with nurse crop on first year after hoed crop.
4. Seeding rye grass 10 lbs. and red clover 10 lbs. alone after hoed crop.
5. Seeding rye grass 10 lbs. and red clover 10 lbs. with nurse crop on first year wheat stubble.
6. Seeding rye grass 10 lbs. and red clover 10 lbs. alone after first year wheat.
7. Seeding rye grass and red clover with oats to cut green on first year wheat stubble.
8. Seeding rye grass 10 lbs. and red clover 10 lbs. alone on first year wheat stubble, manure 8 tons per acre, ploughed preceding fall.
9. Seeding rye grass 10 lbs. and red clover 10 lbs. with nurse crop on second year wheat stubble.
10. Seeding rye grass 10 lbs. and red clover 10 lbs. alone after second year grain (oats).
11. Seeding rye grass 10 lbs. and red clover 10 lbs. with nurse crop on second year after hoed crop.

For this work, 55 plots are required, 5 groups of 11 each. Each plot is left at least 2 years in grass excepting plots 9 and 10, and is left long enough to permit of the right point in the rotation being reached to allow seeding according to directions, the object being to try methods of seeding, regardless of other considerations. All plots in any one range to be seeded down the same year.

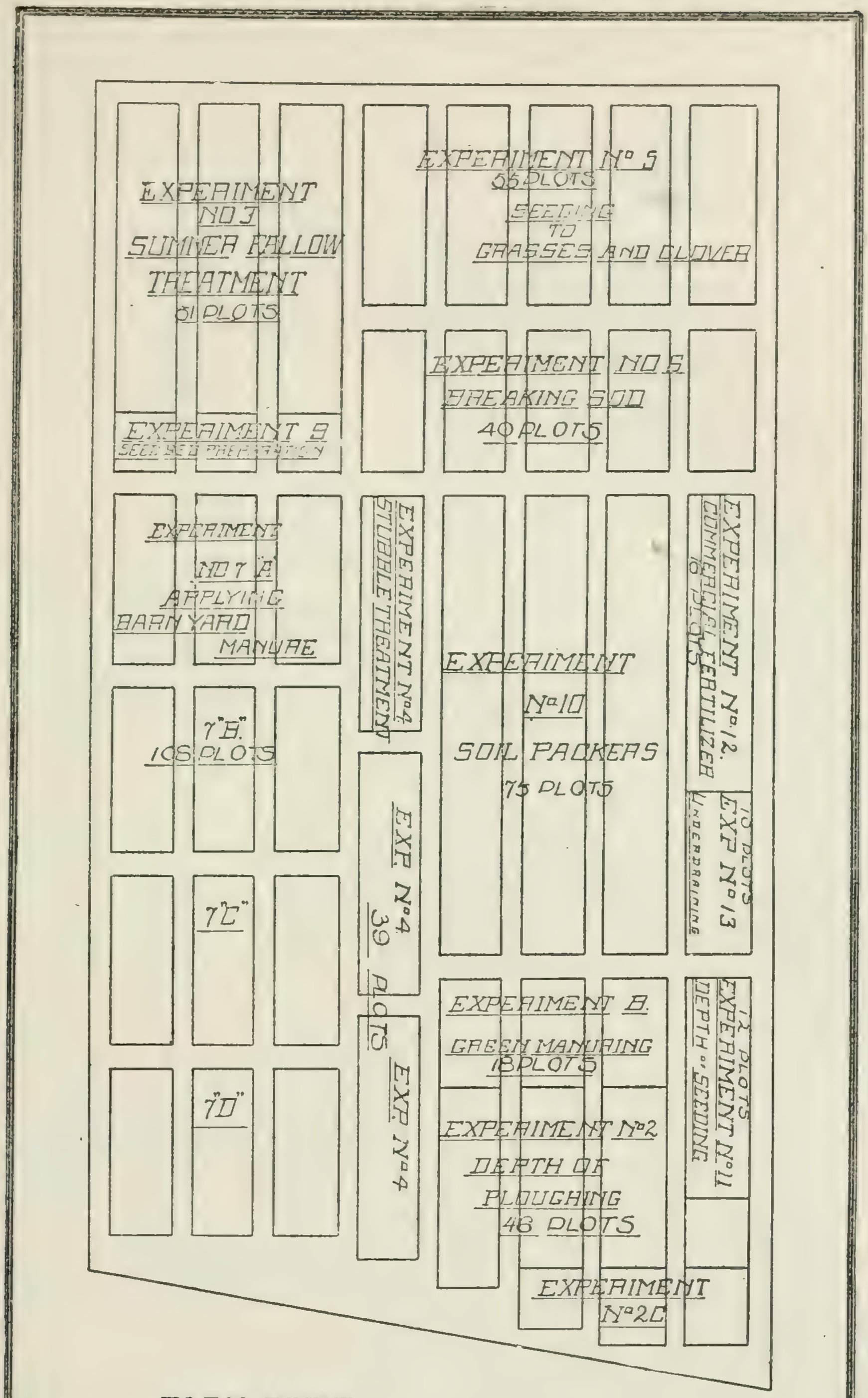
Barnyard manure is applied autumn of first year in grass, 12 tons per acre.

Rotations followed in Seeding to Grass and Clover Experiments.

Since the rotations necessary to follow to bring each plot into proper shape for seeding to grass must vary, the rotation for each plot is given below. All rotations will be of five years' duration. All grass seeding to be done on one range each year.

SEEDING to Grass and Clover Rotations.

Plot.	1st Year.	2nd Year.
1	Fallow	Seeded with wheat.
2	"	Seeded alone
3	Hoed crops	Seeded with wheat.
4	"	Seeded alone.
5	Wheat	Seeded with wheat on stubble.
6	"	Seeded alone.
7	"	Seeded with oats on wheat stubble.
8	"	Seeded alone.
9	"	Seeded with wheat.
10	Oats	Seeded alone.
11	Wheat	Seeded with wheat.



PLAN OF THE
CULTURAL INVESTIGATION.
PLOTS.
INDIAN HEAD EXPERIMENTAL FARM.
SCALE 1 INCH PER 100 FEET

SEEDING to Grass and Clover Rotations—*Continued.*

Plot.	3rd Year.	4th Year.	5th Year.
1	Hay	Hay	Hay
2	"	"	"
3	"	"	"
4	"	"	"
5	"	"	Summer-fallow
6	"	"	"
7	"	"	"
8	"	"	"
9	"	Summer-fallow	Wheat
10	"	"	"
11	"	Hay	Hoed crop.

EXPERIMENT No. 6.

BREAKING SOD FROM CULTIVATED GRASSES AND CLOVERS.

1. Plough July 20 to 30, 5 inches deep. Pack and disc at once—disc in fall.
2. Plough October, 5 inches deep—pack—disc harrow.
3. Plough early July 3 inches deep—backset September, cultivate as necessary.
4. Stiff-tooth rip July—plough 5 inches deep September—cultivate.
5. Spring plough 5 inches deep—seed same spring to wheat.
6. Duplicate No. 5—sow flax.
7. Repeat No. 5—sow peas.
8. Plough May 15—work as summer-fallow.

In each case, necessary cultivation to be given at right time to insure success. Packer to be used on every plot at right time.

Forty plots are required for this experiment. Five groups of eight each in five-year rotation:—

1st year.—(1911). Seed down, no nurse crop, western rye grass 10 lbs., alfalfa 3 lbs., clover 3 lbs. per acre.

2nd year.—Hay.

3rd year.—Hay.

4th year.—Break.

5th year.—Crop, and seed western rye grass 10 lbs., alfalfa 3 lbs., red clover 3 lbs. Leave stubble and new seeds as long as possible in order to be able to judge of catch of seed, then plough and prepare for seeding next spring without nurse crop, as in first year of rotation.

In 1911.—Whole area will be seeded down without nurse crop.

In 1912.—Whole area will be under hay.

In 1913.—First group of eight to be broken according to scheme; rest in hay.

In 1914.—First group of eight to be in grain, seeded down as described and reploughed in fall.

Second group of eight to be broken.

Rest of groups in hay.

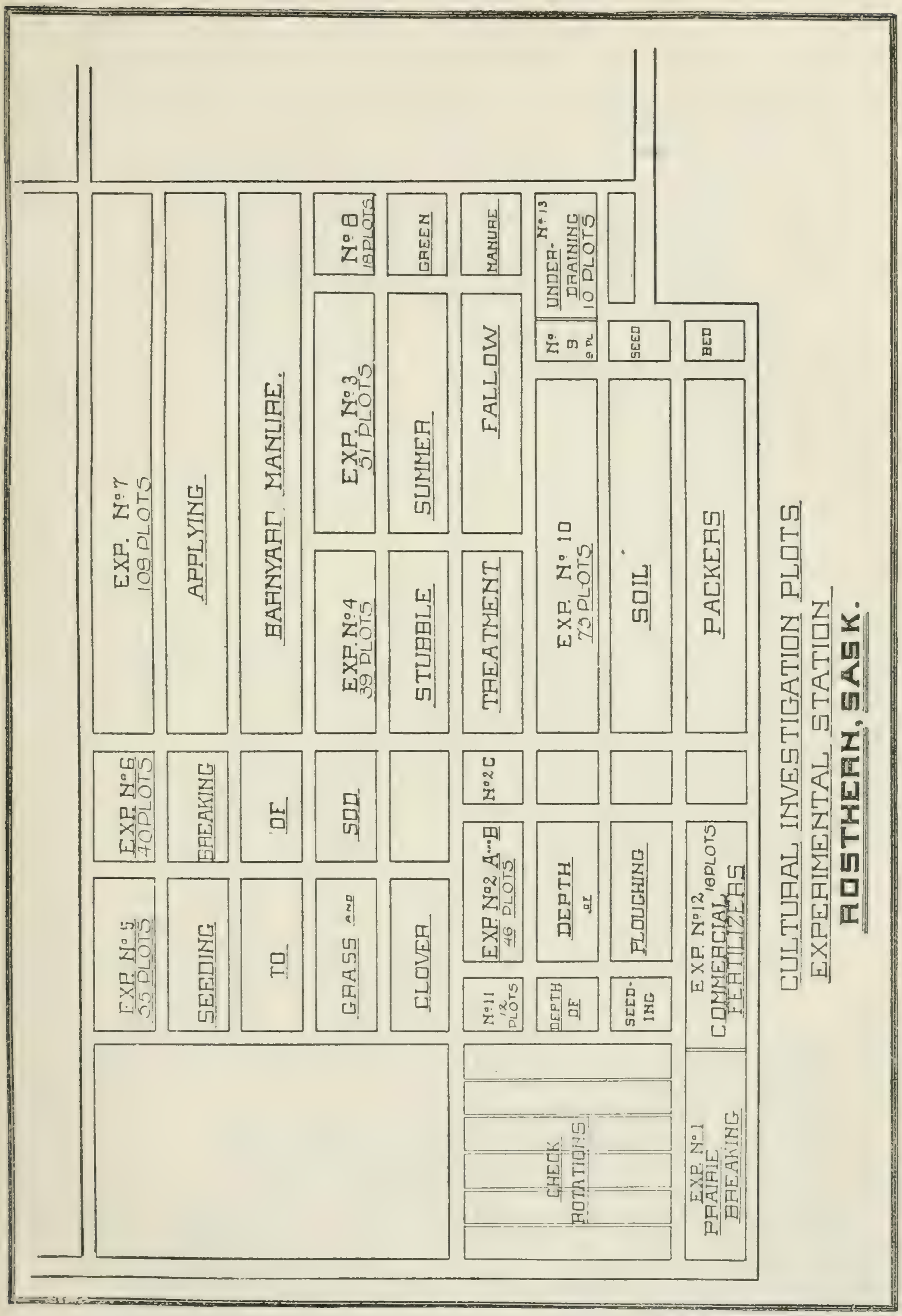
In 1915.—First group seeded down, no nurse crop.

Second group to be in grain seeded down as described, then fall ploughed

Third group to be broken.

Rest of groups in hay.

In 1916.—First group in first year hay, etc.


EXP. N°7
108 PLOTS
APPLYING
BARNYARD MANURE.
EXP. N°4
39 PLOTS
STUBBLE
TREATMENT
EXP. N°3
51 PLOTS
SUMMER
FALLOW
N° 8
18 PLOTS
GREEN
MANURE
EXP. N° 10
73 PLOTS
SOIL
PACKERS
N° 9
9 PL
UNDER-DRAINING
N° 13
10 PLOTS
SEED
BED
EXP. N°5
55 PLOTS
SEEDING
TO
GRASS AND
CLOVER
EXP N°6
40 PLOTS
BREAKING
OF
SOD
EXP. N°2 A-B
46 PLOTS
N°2 C
N°11
12
PLOTS
DEPTH
OF
PLOUGHING
SEED-
ING
EXP. N°12
COMMERCIAL
FERTILIZERS
10 PLOTS
EXP. N°1
PRAIRIE
BREAKING
CHECK
ROTATIONS
CULTURAL INVESTIGATION PLOTS
EXPERIMENTAL STATION
ROSTHERN, SASK.

EXPERIMENT No. 7.

APPLYING BARNYARD MANURE.

On Corn or Roots.

A. 1. No manure, second year stubble, ploughed in autumn.
2. Apply on surface in autumn after ploughing second year stubble, and work in at once.
3. Apply in spring on surface of ploughed land, second year stubble and work in at once.
4. Plough in autumn right after applying, second year stubble.
5. Plough in spring right after applying, second year stubble.
6. Winter apply, plough in spring, second year stubble.
7. Winter apply, green manure (cut straw) on second year stubble—plough in spring.
8. Winter apply, green manure (cut straw) on summer-fallow—disc in.
9. Summer-fallow—Hoed crop—Wheat.

Three-year rotation followed:—
1st year.—Hoed crop.
2nd year.—Wheat.
3rd year.—Wheat.

In case of plots No. 8 and 9 a special rotation as follows:—
1st year.—Hoed crop.
2nd year.—Wheat.
3rd year.—Summer-fallow.

On Wheat.

B. 1. Apply in winter green manure (cut straw) first year stubble. Disc in.
2. Apply in winter green manure (cut straw) summer-fallow. Disc in.
3. Apply with spreader after grain sown on first year stubble.
4. Apply with spreader after grain sown on summer-fallow.
5. No manure. Fall ploughed. First year stubble.
6. Apply on surface first year stubble and plough in in autumn.
7. Apply on surface first year stubble and plough in in spring .
8. No manure. Disc. First year stubble.
9. No manure. Burn stubble.

Three-year rotation to be followed:—
1st year.—Summer-fallow.
2nd year.—Wheat.
3rd year.—Wheat.

Manure applied to affect second year crop of wheat unless otherwise stated.

On Barley.

C. 1. Apply in winter green manure (cut straw) on first year stubble. Disc in.
2. Apply in winter green manure (cut straw) on summer-fallow, sow barley on summer-fallow.
3. Apply with spreader after barley sown on first year stubble.
4. Apply with spreader after seeding barley on summer-fallow.
5. No manure. Fall ploughed. First year stubble.
6. Apply on surface first year stubble and plough in in autumn.
7. Apply on surface first year stubble and plough in in spring.
8. No manure. Disc. First year stubble.
9. No manure. Burn stubble.

Three-year rotation to be followed:—
1st year.—Summer-fallow.

2nd year.—Wheat or barley as indicated.
3rd year.—Barley, or oats as indicated; where barley follows summer-fallow, oats to follow barley.
Manure to be applied to affect crop of barley.

On Oats.

D. 1. Apply in winter green manure (cut straw)) on first year stubble. Disc in.
2. Apply in winter green manure (cut straw) on summer-fallow, sow oats on summer-fallow.
3. Apply with spreader after grain sown on first year stubble.
4. Apply with spreader after seeding to oats on summer-fallow.
5. No manure. Fall ploughed. First year stubble.
6. Apply on surface first year stubble and plough in in autumn.
7. Apply on surface first year stubble and plough in in spring.
8. No manure. Disc. First year stubble.
9. No manure. Burn stubble.

Three-year rotation to be followed:—
1st year.—Summer-fallow.
2nd year.—Wheat or oats as indicated.
3rd year.—Oats or barley as indicated; where oats follows summer-fallow, barley should follow oats.
Manure applied to affect crop of oats.

EXPERIMENT No. 8.

GREEN MANURING.

1. Summer-fallow.
2. Peas, two bushels Golden Vine (or other similar variety) ploughed under early in July.
3. Peas, two bushels Golden Vine, ploughed under when in blossom.
4. Tares, one bushel per acre, ploughed under late July.
5. Summer-fallow, barnyard manure, 12 tons per acre, applied on summer-fallow in September.
6. Summer-fallow.

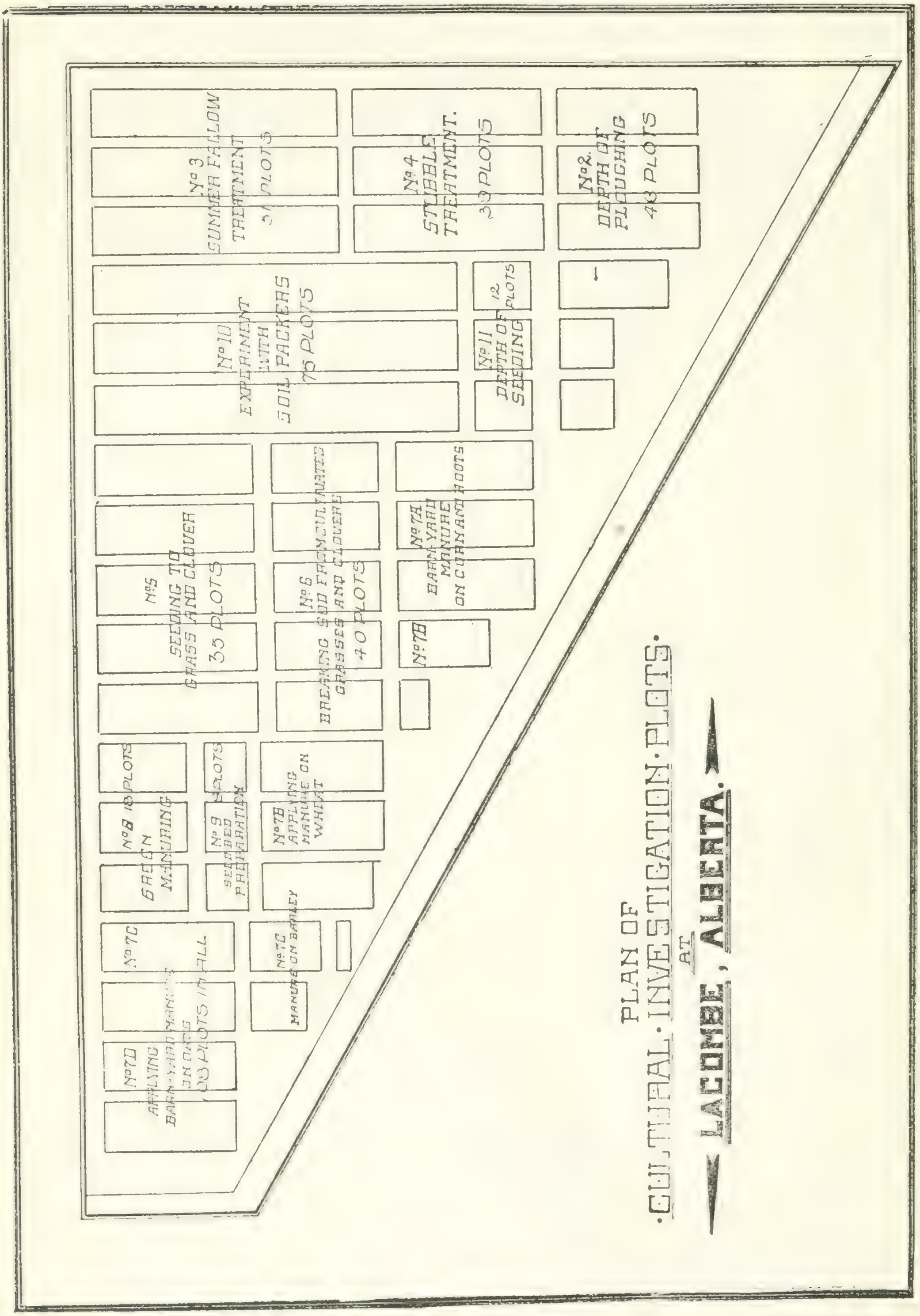
For this work, three groups of plots of six each, or 18 plots in all, are required.
In 1911.—Group 1. Treated.
Group 2. Wheat.
Group 3. Oats.
In 1912.—Group 1. Wheat.
Group 2. Oats.
Group 3. Treated.
In 1913.—Group 1. Oats.
Group 2. Treated.
Group 3. Wheat.

EXPERIMENT No. 9.

SEED BED PREPARATION.

1. Poor preparation.
2. Good preparation.
3. Extraordinary preparation.

To carry on this experiment, three groups of three plots each will be required, or nine plots in all.


PLAN OF
AGRICULTURAL · INVESTIGATION · PLOTS.
AT
LACOMBE, ALBERTA.
No 3 SUMMER FALLOW TREATMENT 51 PLOTS
No 4 STUBBLE TREATMENT. 39 PLOTS
No 2. DEPTH OF PLOUGHING 48 PLOTS
No 10 EXPERIMENT WITH SOIL PACKERS 75 PLOTS
No 11 DEPTH OF SEEDING 12 PLOTS
No 5 SEEDING TO GRASS AND CLOVER 35 PLOTS
No 6 SOD FRACTURED SEEDING TO GRASSES AND CLOVERS 40 PLOTS
No 7A BARN YARD MANURE ON CORN AND ROOTS
No 7B
No 8 18 PLOTS BARN MANURING
No 9 SEED BED PREPARATION
No 7B APPLYING MANURE ON WHEAT
No 7C MANURE ON BARLEY
No 7C
No 7D APPLYING BARN-YARD MANURE ON OATS 33 PLOTS IN ALL

1911 Group—1. Summer-fallow.
2. Wheat.
3. Oats.
1912 Group—1. Wheat.
2. Oats.
3. Summer-fallow.
1913 Group—1. Oats.
2. Summer-fallow.
3. Wheat.

What constitutes 'poor,' 'good,' or 'extraordinary' preparation of the seed bed cannot, of course, be described or outlined, hence the judgment of the experimenter will have to be exercised and such preparation given the plot in question as he deems will come nearest being described by the word used, 'poor,' 'good,' or 'extraordinary.'

In the summer-fallow year, all plots are to be treated alike. The treatment when seeding on summer-fallow land the next spring must, however, be such as to merit the descriptive words.

Manure 6 tons per acre on first year stubble.

EXPERIMENT No. 10.

SOIL PACKERS.

Sowing Wheat on Summer-Fallow.

A.

Spring work when seeding.
1. Harrow, seed.
2. Harrow, seed, surface pack.
3. Harrow, seed, surface pack, harrow.
4. Harrow, seed, subsurface pack.
5. Harrow, seed, subsurface pack, harrow.
6. Harrow, seed, combination pack.
7. Harrow, seed, combination pack, harrow.
8. Surface pack, seed, surface pack.
9. Subsurface pack, seed, subsurface pack.
10. Combination pack, seed, combination pack.
11. Surface pack, harrow, seed.
12. Subsurface pack, harrow, seed.
13. Combination pack, harrow, seed.
14. Harrow, seed.

15. Plough for summer-fallow, surface pack, cultivate; next spring, smoothing harrow, seed.
16. Plough for summer-fallow, subsurface pack, cultivate; next spring, smoothing harrow, seed.
17. Plough for summer-fallow, combination pack, cultivate; next spring, smoothing harrow, seed.
18. Plough for summer-fallow, surface pack, cultivate; next spring, smoothing harrow, seed, surface pack.
19. Plough for summer-fallow, subsurface pack, cultivate; next spring, smoothing harrow, seed, subsurface pack.
20. Plough for summer-fallow, combination pack, cultivate; next spring, smoothing harrow, seed, combination pack.

Spring work when seeding.
21. Harrow, seed.
22. Harrow, seed, harrow when 6 inches high.
23. Harrow, seed, surface pack when 6 inches high.
24. Harrow, seed; roll when 6 inches high.
25. Harrow, seed.

Sowing on Spring Ploughed Stubble Land.

B.

1. Harrow, subsurface pack, harrow, seed.
2. Harrow, surface pack, harrow, seed.
3. Harrow, combination pack, harrow, seed.
4. Harrow, subsurface pack, harrow, seed, subsurface pack.
5. Harrow, surface pack, harrow, seed, surface pack.
6. Harrow, combination pack, harrow, seed, combination pack.
7. Harrow, seed, harrow.
8. Harrow, seed, surface pack.
9. Harrow, seed, subsurface pack.
10. Harrow, seed, combination pack.
11. Harrow, seed.

Sowing on Fall Ploughed Stubble Land.

C.

12. No packer, harrow, seed.
13. Subsurface pack in fall, seed in spring.
14. Subsurface pack in spring, then seed.
15. Subsurface pack in spring, after seeding.
16. Surface pack in fall, seed in spring.
17. Surface pack in spring, then seed.
18. Surface pack in spring after seeding.
19. Combination pack in fall, seed in spring.
20. Combination pack in spring, then seed.
21. Combination pack in spring after seeding.
22. No packer, harrow, seed.
23. Surface pack in fall, seed, surface pack.
24. Subsurface pack in fall, seed, subsurface pack.
25. Combination pack in fall, seed, combination pack.

To carry on this work, 75 plots are necessary, three groups of 25 each. Each year the experiments on summer-fallow are tried on the group under summer-fallow the previous year.

A three-year rotation is followed:—

1st year—Summer-fallow.
2nd year—Wheat.
3rd year—Wheat.

Manure applied 6 tons per acre on stubble of second crop after summer-fallow, that is, fall previous to summer-fallow.

Method of summer-fallowing:—Fall disc, plough before June 15, cultivate as necessary; plots 1 to 14 inclusive, and 21 to 25 inclusive. In case of plots 15 to 20 inclusive, summer-fallow as indicated in Exp. No. 10, Section A.

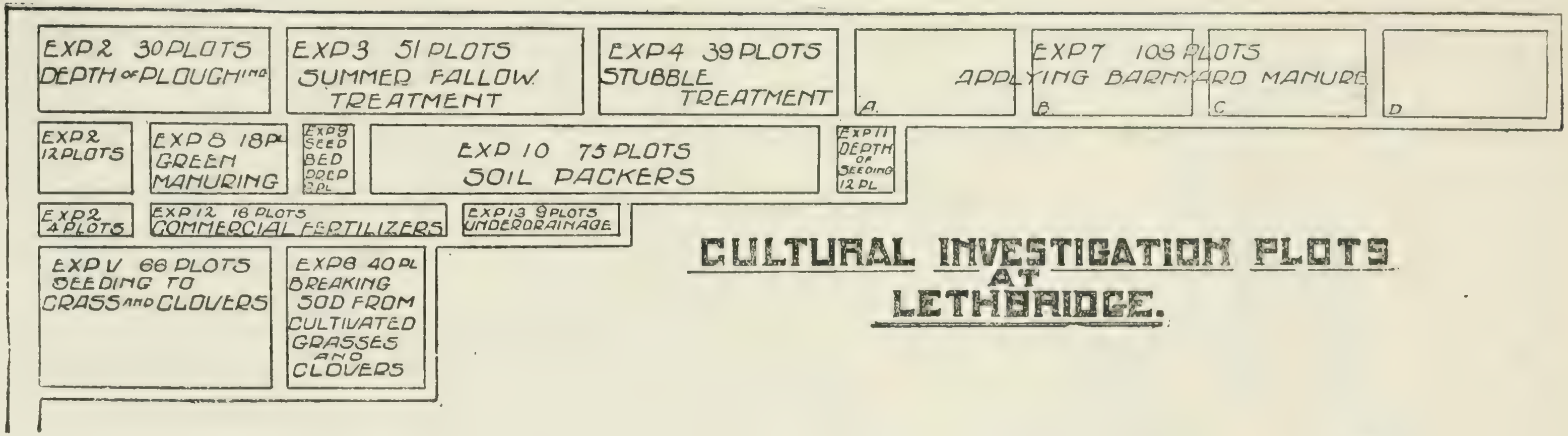
EXPERIMENT No. 11.

DEPTH OF SEEDING.

1. Sowing 1 inch deep.
2. Sowing 2 inches deep.
3. Sowing 3 inches deep.
4. Sowing 4 inches deep.

For this work 12 plots will be necessary—three groups of four plots each.

Group 1—1911. Summer-fallow.
1912. Wheat.
1913. Oats.



CULTURAL INVESTIGATION PLOTS AT LETHBRIDGE.

Group 2—1911. Oats.
1912. Summer-fallow.
1913. Wheat.
Group 3—1911. Wheat.
1912. Oats.
1913. Summer-fallow.
Wheat on summer-fallow.
Oats on stubble.
Stubble to be fall ploughed and packed.
Manure 6 tons per acre in autumn on wheat stubble.

EXPERIMENT No. 12.

COMMERCIAL FERTILIZER.

1. Check. No fertilizer.
2. N. Eight pounds Nitrate of Soda.
3. $P_2 O_5$. Fifteen pounds Superphosphate.
4. $K_2 O$. Five pounds Muriate of Potash.
5. Check. No fertilizer.
6. N. $P_2 O_5$. $K_2 O$.
7. N. $P_2 O_5$.
8. N. $K_2 O$.
9. $P_2 O_5$. $K_2 O$.
10. Check. No fertilizer.
11. Basic Slag, 25 lbs.
12. Clover in place of grass.
13. Clover in place of grass.
14. Barnyard manure, 16 tons.
15. Barnyard manure, 8 tons.
16. Check. No fertilizer.

Only 16 plots required, all in same range.
On these plots a four-year rotation is to be followed:—
1st year.—Wheat, all plots.
2nd year.—Oats, all plots.
3rd year.—Grass, all plots.
4th year.—Corn, all plots.
All commercial fertilizers to be applied on the surface each spring before seeding.
Barnyard manure to be applied on surface and worked in in fall before corn.
Grass land to be ploughed shallow after one crop hay and kept cultivated rest of season preceding corn.

EXPERIMENT No. 13.

UNDERDRAINING.

1. No drainage.
2. No drainage.
3. Well 4 feet by 4 feet by 6 feet deep, drain 3 feet deep.
4. No drainage.
5. No drainage.
6. No drainage.
7. Well 4 feet by 4 feet by 6 feet deep, drain 4 feet deep.
8. No drainage.
9. No drainage.

For this work, only nine plots will be required. These plots should be so located as to permit of tile drains being laid from plots 3 and 7 with a good fall into a suitable outlet, natural or artificial. All plots to be in same range.

Crops would be:—

1911.—Wheat, all plots.

1912.—Wheat, all plots.

1913.—Summer-fallow, all plots.

Apply 6 tons manure per acre, fall or winter, on the ploughed 6-inch stubble first year after summer-fallow.

BULLETINS AND PAMPHLETS ISSUED DURING THE YEAR ENDING MARCH 31, 1912.

In addition to a reprint of the French edition of Bulletin 46, on Alfalfa or Lucerne, six new bulletins were issued during the year.

In the Regular Series, Bulletin No. 69, on The Honey Bee: A Guide to Apiculture in Canada, was prepared by the Dominion Entomologist, Dr. C. Gordon Hewitt. As its name implies, it is intended to serve as a guide to those commencing bee-keeping or whose knowledge of the subject is limited, rather than as an exhaustive treatise on bees and apiculture. It contains instructions as to proper location and suitable equipment of apiaries. It discusses the different races of bees and their relative advantages, bee management, the handling of wax and honey and the diseases and enemies which attack the bee. It also gives, *in extenso*, the existing legislation in Canada bearing on bee diseases.

Bulletin No. 70, on Cutworms and Army-worms, by Arthur Gibson, Chief Assistant Entomologist, gives the life-histories of several species of these insects, an account of the injuries they inflict on crops and the various methods practised for their control.

Bulletin No. 71, prepared by the Dominion Cerealist, Dr. C. E. Saunders, with the co-operation of the Superintendents of the branch Experimental Farms and Stations, gives the results obtained on all the Dominion Experimental Farms from trial plots of grains, fodder corn, field roots and potatoes. Lists are also given of the varieties best suited to each province or district, based on the accumulated experience of the period of seventeen years during which this publication has been issued.

Bulletin No. 7, of the Second Series, entitled 'The Destructive Insect and Pest Act and Regulations issued thereunder,' was prepared by the Dominion Entomologist, Dr. C. Gordon Hewitt. It contains the text of the Act passed in May, 1910, governing the importation of nursery stock and the regulations necessary for its administration.

No. 8, of the Second Series, on Alfalfa Growing in Alberta, was prepared jointly by W. H. Fairfield, M.S., Superintendent of the Experimental Station at Lethbridge, Alberta, and G. H. Hutton, B.S.A., Superintendent of the Experimental Station at Lacombe, in the same province. It treats of the possibilities and methods of growing alfalfa in Alberta, both under irrigated and non-irrigated conditions, and of the varieties found most suitable there.

Bulletin No. 9, of the Second Series, by the Dominion Entomologist, Dr. C. Gordon Hewitt, treats of the legislation in Canada dealing with the control of insect pests and summarizes briefly the history and progress of the work to that end.

CORRESPONDENCE.

The following is a summary of the correspondence carried on during the year from the different Divisions of the Central Farm and from the branch Experimental Farms and Stations.

CENTRAL FARM.

Division.	Letters Received.	Letters Sent.
Director (and acting Agriculturist)	31,357	14,945
Horticulturist	4,964	5,399
Cerealist	13,223	5,148
Chemist	2,263	2,205
Entomologist	3,993	5,465
Botanist	1,079	1,373
Poultry Manager	4,956	6,473
French Correspondent	9,955	1,079
Miscellaneous	14,468	4,792
	86,258	46,879

REPORTS, BULLETINS AND CIRCULARS.

Reports and Bulletins Mailed	97,519
Circulars *re* Distribution of Seed Grain	34,989

NOTE.—In explanation of the comparatively small number of reports and bulletins mailed, it may be stated that in January, 1912, the distribution of the Reports and Bulletins of the Experimental Farms was taken over by the Publications Branch of the Department of Agriculture, to whom, in future, applications for such reports and bulletins should be made.

BRANCH EXPERIMENTAL FARMS AND STATIONS.

Farm or Station.	Letters. Received.	Letters Sent.
Charlottetown	1,013	909
Nappan	2,482	2,215
Cap Rouge	1,604	1,974
Brandon	3,715	3,757
Indian Head	16,407	16,296
Rosthern	873	535
Scott	646	565
Lethbridge	3,670	3,756
Lacombe	4,591	4,033
Agassiz	2,825	2,635
	37,736	36,675

The above figures for the branches are exclusive of reports, bulletins and circulars sent out.

By adding the figures for the Central and Branch Farms, the total number of letters received is seen to be 123,994 and those sent out 83,554.

SEED DISTRIBUTION.

The annual distribution of samples of seed grain of superior quality was carried on as usual in 1911, under new regulations which, while lessening considerably the number sent out, tend to ensure the samples falling into the hands of those who will make good use of them. Applications for samples of grain from all parts of the Dominion and for potatoes from Ontario and Quebec are received and filled at the Central Farm, Ottawa, and the details of this distribution will be found in the report of the Dominion Cerealist, who has supervision of this work.

In addition to the samples sent out from the Central Farm, amounting in all to 13,473, there were distributed from the branch Farms and Stations the following numbers of samples of potatoes:—

Experimental Station,	Charlottetown, P.E.I.	93
"	Farm, Nappan, N.S.	260
"	Farm, Brandon, Man.	115
"	Farm, Indian Head, Sask.	340
"	Station, Lethbridge, Alta.	430
"	Station, Lacombe, Alta.	1,009
"	Farm, Agassiz, B.C.	763
Total		3,010

The total number of samples distributed from the Central and branch Farms for the year is thus seen to be 16,483.

In addition to this free distribution of small samples, the surplus grain grown on the Experimental Farms, not required for sowing the next year, is sold to farmers in lots of from two to six bushels each. The demand for this seed is always much larger than the supply.

NEW BUILDINGS.

During the year, a number of new buildings have been erected on the Central Farm. Among the more important are a Cerealist building, an Auditorium, an Insectary and a Pumphouse and accessories.

The Cerealist building has been designed and built to accommodate under one roof and in suitable quarters the various lines of work under the immediate supervision of the Dominion Cerealist. Of these lines, the more important are the distribution of seed grain and potatoes, wheat milling and the storage of varietal test plot and breeding plot crops.

The Auditorium has been built with a view to provide a suitable place for large gatherings or excursions. It will seat about 700 people. It includes, besides the main hall, a kitchen and a small hall. Provision has been made to do something towards supplying farmers or excursionists with refreshments, and tables sufficient to seat over 400 at a meal at one time can be set up. A judging ring can be easily divided off from the rest of the building, and a good live stock demonstration platform has been erected. It is hoped that this building will enable us to do much more in the way of direct instructional work to farmers within a reasonable radius of Ottawa.

The Insectary has been designed to provide conveniences for the breeding and studying of insects under conditions as nearly approaching the normal for them as climatic conditions at Ottawa will permit.

The water supply for the Farm buildings and houses, as well as for buildings belonging to other Departments but located on the Central Farm, is drawn from the city mains For a number of years this supply has been steadily falling off until, some three years ago, it was found necessary to install a small booster pump. After a few months' experience, it became evident that some more effective system must be devised. In the autumn of 1911, accordingly, a more powerful pump was placed in a house built especially for its accommodation and located at the point where the city water crosses the Farm boundary. A large steel water-storage tank, 30,000 gallons in capacity. was at the same time built on a tower 80 feet high, on the highest point of the Central Farm. This new system has proven eminently satisfactory.

MEETINGS AND CONVENTIONS.

I have, as usual, found time to attend a number of conventions or agricultural meetings during the year.

Among the more important of these might be mentioned Prescott and Russell Counties Teachers' Convention, Hawkesbury, Ont.; Ontario Fat Stock and Poultry Show, Guelph, Ont.; Eastern Ontario Fat Stock and Poultry Show, Ottawa, Ont.; Nova Scotia Farmers' Association, Yarmouth, N.S.; National Live Stock Convention, Ottawa, Ont.; Live Stock Conventions, Toronto, Ont.; Western Ontario Dairymen's Convention, Ingersoll, Ont.; Eastern Ontario Dairymen's Convention, Campbellford, Ont.; National Seed Growers' Association Convention, Ottawa, Ont.; Prince Edward Island Seed Growers' Convention, Charlottetown, P.E.I., and the Ontario Corn Growers' Convention, Tilbury, Ont.

One and, in some cases, four or five addresses or lectures were delivered at each of the above meetings.

VISITS TO BRANCHES.

My official duties as Director and Acting Dominion Agriculturist have necessitated my visiting each of the various Experimental Farms and Stations during the year. To certain Farms or Stations, I have found it necessary to make several visits. These journeys have taken up a very considerable amount of time, but are, of course, necessary to the proper conduct of the system.

ADDITIONS TO AND CHANGES IN THE STAFF.

Mr. Thos. A. Sharpe, Superintendent of the Experimental Farm at Agassiz, B.C., from its establishment in 1888, to March 31, 1911, retired from that position on the latter date to assume the management of his own farm at Salmon Arm, B.C.

Horticultural work was one of the chief features of the Agassiz Farm under Mr. Sharpe's superintendency and his careful testing of varieties of fruits, vegetables, flowers, trees and shrubs, together with the very complete records taken in each case, must be considered as having very materially assisted in the development of horticulture in British Columbia.

Mr. Sharpe's farm at Salmon Arm is devoted mainly to fruit-culture and arrangements have been made whereby he reports from time to time to the Department on his work there, so that the benefits of his experience along horticultural lines will still be available to the public.

The vacancy caused by the resignation of Mr. Thos. A. Sharpe, Superintendent of the Experimental Farm at Agassiz, B.C., was filled by the appointment of Mr. P. H. Moore, B.S.A., to that position.

Mr. Moore was born and brought up on a dairy farm in Nova Scotia. He took a dairy school course at the Agricultural College, Truro, N.S., and then spent two seasons on the road in Nova Scotia with a travelling dairy. He spent two years at the Truro Agricultural College proceeding thence to the Ontario Agricultural College, Guelph, to complete the studies necessary for the degree of B.S.A. On graduating, he spent a year at the South Dakota Experiment Station and Agricultural College and from that institution went to British Columbia as Dairy Inspector, which work he left to take the position he now occupies.

Miss Faith Fyles, B.A., Assistant Botanist, is the daughter of the Rev. Dr. Fyles, F.L.S. Miss Fyles was educated at King's Hall, Compton, where she graduated with honours, obtaining the medal and special prizes in botany and other subjects. She entered college with a first-class scholarship and, after a successful four-years' course, obtained the degree of B.A. from McGill University.

She spent the next year in studying the flora of Quebec with her father and, at the same time, in taking a course of drawing in colour from the well-known artists Mr. Robert Wickenden and Mr. Walter Griffin, then holding classes at the Quebec Studio Club, of which Miss Fyles was a member.

After six years' experience in teaching in Dunham Ladies' College and the Bishop Strachan School, she spent a year in travel and study in Europe.

She entered the government service as Assistant Seed Analyst in 1909, and was transferred to the Experimental Farm staff in 1911.

Mr. J. W. Eastham, B.Sc., Chief Assistant Botanist, was born in Liverpool, England, in 1879. His technical training was acquired at the Lancashire School of Agriculture in 1894-6, and at the University of Edinburgh in 1896-9, from which latter institution he graduated in 1899, with the degree of B.Sc., with 'Special Distinction' in Botany. For two years he occupied the position of assistant in the Department of Chemistry of Edinburgh University, which work he left to become lecturer in biology at the Cheshire College of Agriculture, where he remained until 1906. From 1906 to 1911 he was lecturer in botany at the Ontario Agricultural College, Guelph. During this period he spent a year's leave of absence in post-graduate work at Cornell University, in the Departments of Plant Pathology and Plant Physiology.

He resigned his position at the Guelph Agricultural College to take his present appointment.

Mr. J. M. Swaine, M. Sc., Assistant Entomologist, was born in 1879 at Barrington, N.S. He received his elementary training in Yarmouth Academy, and the Nova Scotia Normal School at Truro. He taught school for four years and then spent two years as assistant in the Agricultural College at Truro.

He graduated from Cornell University in 1906, having specialized in entomology and zoology, receiving the degree of M.Sc. in A.

During the years 1906-7, he was assistant in entomology and zoology at Cornell, which position he left to become lecturer in entomology and zoology at Macdonald College, Que. He filled this position until he accepted an appointment to the staff of the Dominion Experimental Farms, in 1911.

Mr. F. E. Buck, B.S.A., Assistant to the Dominion Horticulturist, was born at Colchester, England, in 1875. He received his early education at private schools in that city. As a youth, he received considerable training in fruit growing and general horticultural methods under his father's direction.

Coming to Canada in 1903, he spent the following year at Mount Hermon College, in Massachusetts, where he took a special course in forestry and landscape gardening. For two years he filled the position of campus superintendent of a seventy-acre college campus, and later planned and executed various pieces of private landscape work in the State of New York.

Parts of the years 1907 and 1908 he spent at Cornell University, taking special courses in horticulture, plant diseases, etc., and later on, in 1908, he entered Macdonald College of McGill University, taking a four-year course in three years, specializing in floriculture and landscape gardening, offering his thesis in work relating to the latter. He received his degree of B.S.A. in 1911.

While at college and during the summer recesses, he was engaged one year to plan and plant the ornamental grounds of Macdonald College.

Upon the completion of his course, he was appointed to his present position.

The position of Assistant to the Superintendent of the Experimental Station at Lethbridge, Alta., was filled in June, 1911, by the appointment of F. S. Grisdale, B.S.A.

Mr. Grisdale was born at Ste. Marthe, Que., in 1887. He pursued his early studies in the public schools of Quebec, and entered Macdonald College as one of the agricultural students in the opening year of that institution, 1907. He took the four-

year course in agriculture, graduating with the degree of B.S.A. from McGill University in 1911, having taken the agriculture and live stock option.

ACKNOWLEDGMENTS.

For the efficient performance of duty and willing co-operation in all Divisions, my thanks are due the different members of the staff, both at Ottawa and at the various branch Farms. This being my first year as Director, I feel deeply grateful for the loyal support of officers of all Divisions and at all the branch Farms. The large measure of confidence accorded and the kind sympathy shown have rendered comparatively easy and pleasant of performance, duties otherwise exceedingly strenuous and difficult of fulfilment.

To Mr. O. C. White, Assistant in Field Husbandry and to Mr. D. D. Gray, Farm Superintendent, I am especially indebted for particular care and untiring energy in carrying on live stock and cultural work on the Central Farm, Ottawa.

To my Assistant, Mr. F. W. Patterson and to my Secretary, Mr. M. C. O'Hanly, my sincere thanks are due for invaluable assistance given me in my executive duties and for the most satisfactory manner in which their work has invariably been done.

REPORT OF THE (ACTING) DOMINION AGRICULTURIST

J. H. GRISDALE, B. AGR.

The following report of the Agriculturist's work on the Central Farm has been prepared under my supervision by Mr. O. C. White, Assistant to the Dominion Agriculturist, aided by Mr. D. D. Gray, Farm Superintendent.

Therein will be found reports on the horses and upon the breeding and feeding operations with beef cattle, dairy cattle, sheep and swine upon the Central Farm, as well as a detailed account of the cultural and rotation work under way here during the past season.

LIVE STOCK.

The live stock now (April 1, 1912) under my charge includes horses, cattle, sheep and swine.

HORSES.

The horses are kept for labour purposes exclusively, no breeding whatever being done.

They are eighteen in number made up at present of:—

14 heavy horses of Clydesdale and Percheron blood.
3 heavy driving horses.
1 light driver.

CATTLE.

There are in all 127 head in the stables, made up of 97 pure-breds, 1 Canadian grade cow and 29 fateening steers. The pure-breds are kept for experimental breeding and feeding work, and steers are used experimentally to determine cost of production under different conditions, and with various food-stuffs.

Pure-bred Breeding Cattle.

Holsteins—Twelve, including 9 females and 3 males.
Ayrshires—Thirty-four, including 31 females and 3 males.
Guernseys—Twenty, including 18 females and 2 males.
Jerseys—Six, including 5 females and 1 male.
French-Canadians—Twenty-five, including 19 females and 6 males.

Steers.

Twenty-nine pure-bred and grade steers are under feed at present, representing the Shorthorn, Angus, Galloway and Hereford breeds.

SHEEP.

There are now 59 sheep in the pens, made up of 39 pure-bred Shropshires and 20 pure-bred Leicesters.

The Shropshires include 1 ram, 13 mature ewes, 3 shearling ewes and 22 spring lambs.

The Leicesters include 1 ram, 7 mature ewes, 4 shearling ewes and 8 spring lambs.

SWINE.

193 swine are on hand, made up of 109 Yorkshires, 43 Berkshires and 41 Tamworths.

The Yorkshires include two stock boars, 26 brood sows, 5 young sows, 60 young pigs and 16 feeders.

The Berkshires include 2 stock boars, 14 brood sows, and 27 young pigs.

The Tamworths include 1 stock boar, 16 brood sows, 4 young sows and 20 young pigs.

HORSES.

The work of the horses includes the regular farm operations of the Agricultural Division, work for the Horticultural, Cereal, Poultry and Botanical Divisions, cartage in connection with all the Divisions, road making and messenger service.

HORSE LABOUR.

During the year, from April 1, 1911, to March 31, 1912, the work done by the horses kept in the stables here was equivalent to 5,379·6 days' work, distributed as follows:—Live stock, hauling feed, marketing stock, etc., 147 days; farm work '200-acre farm' 903 days; manure on '200-acre farm' 409 days; Horticultural Division, 780·4 days; Cereal Division, 671 days; Poultry 24·6 days; bulletins and reports from and to farm offices, 48·9 days; delivery of milk, 46·8 days; lawns, 118·5 days; omnibus service, including one horse for omnibus, two horses for general driving and one horse for supervision of work, 1,456 days; care of roads on farm, 27·5 days; various, including work about outbuildings, sidewalks, exhibitions, etc., 746·9 days.

DAIRY CATTLE.

During the year Holsteins and Jerseys have been added to our list of breeds kept and the entire herd of dairy Shorthorns has been transferred to the Dominion Experimental Farm, Brandon.

SUMMER FEEDING.

Relative to the number of cows, the available pasture here is very small so that we depend for the most part upon soiling crops and corn silage for summer feed. Corn silage was fed in considerable quantities all summer long, and except for the few weeks that they were on full pasture, green feeds were cut and fed in the stable, or in the pasture field, clover and alfalfa, and mixed peas and oats constituting the supply.

During the early part of the summer the cows were let out in the field in the daytime and stabled at night, but as the flies became troublesome they were housed during the day and given the freedom of the field at night.

WINTER FEEDING.

The winter ration has been on the average about as follows:—

Hay (mixed clover and timothy)	6 lbs.
Corn silage	30 "
Roots (mangels and turnips)	10 "
Straw (oat)	4 "
Meal (usually consisting of a mixture of 800 lbs. bran, 300 lbs. gluten and 200 lbs. of oil cake or cotton seed cake).	7 "

The meal is scattered on the roughage mixture of roots, ensilage and cut straw after it is before the cattle. The hay is fed uncut, after the other material is eaten up. Water is before them all the time. Salt is added to their roughage at the time it is being mixed and rock salt is placed in the mangers of those cows that seem to require more than the average quantity.

DAIRY HERD RECORDS.

The dairy cow milk records are reported upon by lactation periods rather than according to the fiscal year, as has previously been done. This change seemed advisable in that a cow's merits are usually calculated on a basis of her production per lactation period.

In the case of heifers with first calves, charges for feed include the consumption from a date two months previous to parturition to the time of being dried. In the case of all following lactation periods the feed charges cover a time from drying to drying.

In estimating the cost of feeding the following values were used.

Pasture, per month	$ 1 per cow.
Meal mixture	25 per ton.
Clover hay	7 "
Straw	4 "
Roots and ensilage	2 "
Green feed	3 "

In calculating the value of the product, 28 cents per pound is allowed for the butter and 20 cents per 100 lbs. for the skim milk. The butter sold at from 25 cents to 40 cents per pound.

In computing these returns the bedding, and the labour in connection with caring for the cows and manufacturing the butter have not been taken into account, nor have they been credited with the manure made.

All cows are reported upon that have finished a lactation period within the dates of the fiscal year 1911-1912, except a few Holsteins and Jerseys that were bought, and whose records previous to the time of purchase were not obtainable. This list does not of course include all cows that are at present in milk, as many are heifers not far advanced in their first lactation period.

Names of Cows.	Age at beginning of Lactation Period.	Date of Dropping Calf.	Number of days in Lactation Period.	Total pounds of Milk for Period.	Daily average Yield of Milk.	Average per cent Fat in Milk.	Pounds of butter produced in Period.	Value of Butter at 28c per lb.
Flavia 2nd of Ottawa.....A.	5	Jan. 6, '11....	267	9,364	35·1	4·42	486·61	136·25
Marjorie (imp. in dam).....A.	12	Mar. 20, '11 . .	377	10,487	27·8	3·86	477·01	133·56
Inoquette.....C.	7	" 11, '11 ...	302	8,292	27·50	4·40	429 09	120·14
Alma.....G.G.	11	Aug. 15, '10....	319	7,951	24 9	5·55	441·18	123·53
Pearly Prize.....G.	5	Mar. 15, '11....	302	6,816	22·6	5·41	433 75	121·45
Marjorie 2nd of Ottawa .....A.	4	Sept. 5, '10....	329	8,430	25 60	4·39	435·60	121·97
Denty 4th of Ottawa.....A.	4	Mar. 21, '11....	244	7,839	32 20	4·19	387·05	108·37
Ottawa Itchen.....G.	5	Nov. 25, '10....	309	6,842	22 10	5·05	406·48	113·81
Fannie.....G.C.	6	Feb. 8, '10....	593	9,176	15·50	4·39	474 08	132·74
Aromaz.....C.	3	Mar. 28, '11...	305	6,769	22·2	5·35	362·40	101·47
Maggie 10th of Culcaigre.....A.	12	June 4, '10....	470	11,272	24·0	3 50	464·08	129·94
Fortune 4ème d'Ottawa.....C.	4	Apr. 17, '11....	286	7,462	26 10	4·06	3 6·81	99·91
Fortune Precoce.....C.	4	Mar. 6, '11....	269	6,639	24·70	4·37	341·44	95·60
Duchesse 5ème .....C.	3	Dec. 29, '10....	262	6,420	24 50	5·12	328·76	92·05
Rejane 2ème d'Ottawa.....C.	4	Nov. 21, '10....	320	5,333	16 70	5·14	322·55	90·31
Flavia 3rd of Ottawa.....A.	3	Feb. 13, '11....	307	6,776	22·1	3 99	315·53	88·34
Inoquette 3ème.....C.	3	Apr. 11, '11....	261	4,803	18·46	4·67	264 27	73·99
Soney R.....A.	5	Nov. 15, '10....	258	5,206	20·10	4·18	256·00	71·68
Zamora.....C.	14	Nov. 13, '10....	319	4,792	15·0	5·01	282·54	79·11
Denty 11th of Auchenbrain.....A.	11	July 2, '10....	442	8,167	18·5	3·79	364 06	101·93
Ottawa Kate.....A.	5	Dec. 23, '10....	281	5,644	20·09	4·01	266·61	74·65
Jessie D. of Ottawa.....A.	5	Apr. 28, '11....	273	5,905	21·6	4·51	266·27	74·55
Marjorie 4th of Ottawa.....A.	2	Nov. 17, '10....	256	5,062	19·8	3·89	237·59	66·52
Clarenda.....G.A.	3	Mar. 28, '11....	173	1,556	26·3	4·96	218 93	61·30
Maggie Pulchrae .....A.	2	Dec. 3, '10....	419	6,552	15·6	3·91	305·65	85·58
Itchen's Pride.....G.	2	Feb. 14, '11....	297	4,921	16·5	4·68	270 68	75·79
Jessie E. of Ottawa.....A.	3	Aug. 30, '10....	270	5,373	19·90	3·83	242·06	67·77
Deanie 2nd.....G G.	2	Feb. 14, '11....	215	4,780	22·2	4·94	236·34	66·17
Archer's Pearl.....G.	2	Feb. 1, '11....	297	4,148	14·00	5·00	243·91	68·29
Queenie 2nd.....G.G.	2	Oct. 24, '11....	328	4,739	14·40	5·01	279·11	78·15
Soney of Nappan.....A.	4	Mar. 28, '10....	510	8,165	16·00	3·52	338·06	94·65
Archer's Spot.....G.	2	Dec. 27, '10....	277	4,153	15 0	4·69	228·98	64·11
Dona Clatina.....G.	3	Sept. 14, '10....	259	3,083	11·9	5·36	194·34	54·41
Soney 3rd of Ottawa.....A.	2	Sept. 21, '10....	282	3,601	12 8	4·00	169·46	47·44
Duchesse Perdue.....C.	4	June 22, '11.. .	218	3,536	16·22	3·96	164·90	46·17
Zaza Fille .....C.	2	Mar. 2, '11....	301	3,650	12·1	5·25	191·62	53 65

Value of Skim Milk at 20c. per cwt.	Total Value of Product.	Amount of Meal Eaten at 14c per lb.	Amount of Roots and Ensilage eaten at $2 per ton.	Amount of Hay Eaten at $7 per ton.	Amount of Green Feed Eaten at $3 per ton.	Amount of Straw Eaten at 20c per cwt.	Months on Pasture at $1 per month.	Total cost of Feed for period.	Cost to produce 100 lbs. of Milk.	Cost to produce 1 lb. of Butter, skim milk neglected.	Profit on 1 lb. Butter, skim milk neglected.	Profit on Cow during period, labour neglected.
17·75	154·00	2,158	12,719	1,694	2,420	1,050	4	55·34	59·1	11·4	16·6	98·6
20·02	153·38	2,654	16,367	2,324	2,300	1,145	4	67·41	64·2	14·1	13·9	86·1
15·73	135·87	2,013	11,621	1,461	2,570	780	4	51·30	61·9	12·0	16·0	84·5
15·02	138·55	2,252	11,267	1,747	3,900	1,187	4	57·74	72·6	13·1	14·9	80·8
12·76	134·21	2,228	12,303	1,622	2,340	837	4	55·00	80·7	12·7	15·3	79·2
15·99	137 96	2,362	13,520	1,680	1,520	1,433	6	60·06	71·2	13·8	14·2	77·9
14·90	123·27	1,845	10,847	1,311	2,130	723	4	47·57	60·7	12·3	15·7	75·7
12·87	126.68	1,937	11,667	1,654	2,280	1,023	4	51·12	74 7	12·6	15·4	75·5
18·09	150·83	2,938	18,514	2,055	2,250	1,407	8	76·60	83·5	16·2	11·8	74·2
12·81	114·28	1,904	10,681	1,433	2,369	715	4	48·47	71·6	13·4	14·6	65·8
21·60	151·54	3,425	16,163	1,897	6,480	1,643	7½	86 11	76·4	18·5	9 5	65·4
14·21	114·12	2,023	11,120	1,333	2,250	733	4	49·90	66·9	13·9	14·1	64·2
12·59	108·19	1,957	10,150	1,171	2,270	628	4	47·35	71·3	13·9	14·1	60·8
12·18	104·23	1,987	11,445	1,820	2,020	1,030	3	50·74	79 0	15·4	12 6	53·4
10·02	100·33	1,970	11,755	1,700	2,250	1,018	4	51·72	97·0	16·0	12·0	48·6
12·92	101·26	2,127	12,214	1,775	2,290	836	4	54·11	79·8	17·1	10·9	47·1
9·08	83·07	1,501	8,500	918	2,230	543	4	38·90	81·0	14·7	13·3	44·1
9·88	81·56	1,488	9,032	1,625	1,520	765	2	39·12	75·2	15·3	12·7	42·4
9·02	88·13	1,739	9,949	1,422	2,281	944	4	45·96	95·9	16·3	11·7	42·1
15·60	117·53	2,736	16,639	1,947	6,270	1,675	6	76·39	93·5	21·0	7·0	41·1
10·76	85·41	1,732	9,820	1,184	2,290	837	4	44·71	79·2	16·8	11·2	40·7
11·23	85·83	1,720	11,334	1,418	2,340	752	4	46 80	79·3	17·6	10·4	39·0
9·65	76·17	1,410	9,401	1,437	1,520	928	2	38·18	75·4	16·1	11·9	37·9
8·66	69 96	1,255	7,145	714	2,260	615	3½	33·45	73·5	15·3	12·7	36·5
12·49	98·07	2,364	14,631	2,202	2,270	1,154	4	61·60	94·0	20·2	7·8	36·4
9·30	85·09	1,954	11,140	1,500	2,240	760	4	49·69	101·0	18·3	9·7	35·4
10·26	78·03	1,589	9,935	1,681	800	1,014	4	42·91	79·9	17·7	10·3	35·1
9·09	75·26	1,433	9,247	1,152	2,227	809	4	40·15	84·0	17·0	11·0	35·1
7·81	76·10	1,695	8,465	1,416	2,256	686	4	43·35	104·5	17·7	10·3	32·7
8·92	87·07	2,129	11,907	1,650	2,107	1,163	5½	55·26	116 6	19·8	8·2	31·8
15·65	110·30	3,063	15,281	1,911	6,180	1,363	6½	78·74	96·4	23 3	4·7	31·5
7·85	71·96	1,548	9,760	1,212	2,240	792	4	42·29	101·8	18·5	9·5	29·6
5·79	60·20	1,509	7,687	1,528	.....	723	1	34·32	111 3	17·7	10·3	25·8
6·86	54·30	1,503	8,605	1,512	900	839	3	38·71	107·5	22·8	5·2	15·5
6·74	52·91	1,411	8 750	955	2,250	547	4	38·18	108·0	23·2	4·8	14·7
6·92	60·57	1,701	11,500	1,462	2,287	702	4	46·70	127·9	24·4	3·6	13·8

DAIRY COW RECORDS.

The supplying of forms whereon to record the milk produced or the feed consumed by individual cows in the herd is being continued. Upon application to the Dominion Animal Husbandman any of the following kinds of form will be sent free of cost.

Month long—Daily milk records suitable for herds numbering up to twenty-two cows.

Week long.—Daily records for herds of sixteen cows.

Week long.—Daily records for herds of twenty-four cows.

Monthly summary records.

Yearly summary records.

Feed record forms.

Too much importance cannot be placed upon the value of adopting some method of learning the actual production of each cow in milk, and the forms above mentioned are a convenience to this end that is being utilized by an increasing number of our dairymen every year.

BEEF PRODUCTION.

A number of steers have been fed and marketed during the year. The work has not been of a comparative nature, but the net returns from the different lots are instructive as to the profits or losses likely to result from certain methods followed.

Following is a detailed record of the different lots fed.

Lot 1.

These were Shorthorn steers purchased and placed on test when slightly over one year of age. They had been highly fed, and at the beginning of the test were in a finished condition. At the actual purchase and sale prices the resultant gains were not sufficient to compensate for the feed they consumed. Had the difference between purchase and sale prices been 1¼ cents per pound, there would have been a profit of only 86 cents each. The extremely hot summer of 1911 was not conducive to rapid gains, especially with stall-fed animals.

Number of steers in lot		2
First weight, gross, January 28, 1911	lbs.	2,040
First weight, average	"	1,020
Finished weight, gross, January 13, 1912	"	2,870
Finished weight, average	"	1,435
Total gain in 350 days	"	830
Average gain per steer	"	415
Daily gain per steer	"	118
Daily gain per lot, 2 steers	"	237
Gross cost of feed		$ 102 01
Cost of 1 lb. gain	cts.	12·29
Value of beef, January 28, 1911—2,040 lbs. at 8 cents per lb		$ 163 20
Total cost to produce beef		$ 265 21
Selling price 2,870 lbs. at $8.50 per 100 lbs., less 5 per cent		$ 231 76
Loss		$ 33 45
Loss per steer		$ 16 72
Average valuation per steer to start		$ 81 60
Average value price per steer at finish, January 13, 1912		$ 115 88
Average increase in value		$ 34 28
Average cost of feed per steer		$ 51 00

Amount of meal eaten per lot of 2 steers	lbs.	4,338
Amount of ensilage and roots eaten	"	16,020
Amount of hay eaten	"	2,968
Amount of straw eaten	"	1,395
Amount of green feed eaten	"	2,940

Meal consisted of bran 2,716·2 lbs.; gluten 1,276·4 lbs.; oil cake, 995·4 lbs. Roughage was clover hay, corn ensilage, turnips, mangels and oat straw. Roots were fed during the winter months only, and in varying proportions with the ensilage.

Lot 2.

These Shorthorn steers were dropped in June, 1909, and were practically ready for market in the spring of 1911, but were held to be fed as 'kept over steers.' The result was what we had expected. Though they sold at a high figure there was a net loss for the 'kept over' year of $2.76 each. Had they been sold the previous spring they would have yielded a reasonable profit.

Number of steers in lot		3
First weight, gross, April 1, 1911	lbs.	3,525
First weight, average	"	1,175
Finished weight, gross, January 13, 1912	"	4,500
Finished weight, average	"	1,500
Total gain in 288 days	"	975
Average gain per steer	"	325
Daily gain per steer	"	1·13
Daily gain per lot, 3 steers	"	3·39
Gross cost of feed	$	142 53
Cost of 1 lb. gain	cts.	14·6
Value of beef April 1, 1911—3,525 lbs. at $6.50 per 100 lbs.	$	229 12
Total cost to produce beef		371 65
Selling price,—4,500 lbs. at $8.50 per 100 lbs., less 5 per cent		363 38
Loss		8 27
Loss per steer		2 76
Average valuation per steer to start		76 37
Average value price per steer at finish, January 13, 1912.		121 12
Average increase in value		44 75
Average cost of feed per steer		47 51
Amount of meal eaten per lot of 3 steers	lbs.	6,963·5
Amount of ensilage and roots eaten	"	24,080
Amount of hay eaten	"	4,554
Amount of straw eaten	"	2,092·5
Amount of green feed eaten	"	4,340

Meal consisted of bran 3,929 lbs.; gluten, 1,795 lbs.; oil cake, 1,239 lbs. Roughage was clover hay, corn ensilage, turnips, mangels and oat straw. Roots were fed during the winter months only and in varying proportions with the ensilage.

Lot 3.

This lot of seven Angus steers averaged about the same age as lot 2 Shorthorns, and like them were ready for the block in the spring of 1911, when they might have been disposed of at a profit. The average loss of 6 cents per steer for the 'kept over' year indicates what may be expected by holding animals over after they have once reached market weight and condition, and points to the advisability of rapid feeding and early marketing.

Number of steers in lot		7
First weight, gross, April 1, 1911	lbs.	8,535
First weight, average	"	1,219·3
Finished weight, gross, January 13, 1912	"	1,080·5
Finished weight, average	"	1,543·5
Total gain in 288 days	"	2,270
Average gain per steer	"	324·3
Daily gain per steer	"	1·12
Daily gain per lot 7 steers	"	7·84
Gross cost of feed	$	318 14
Cost of 1 lb. gain	cts.	14
Value of beef, April 1, 1911, 8,535 lbs. at $6.50 per 100 lbs.	$	554 77
Total cost to produce beef		872 91
Selling price 10,805 lbs. at $8.50 per 100 lbs. less 5 per cent		872 50
Loss	cts.	41
Loss per steer	"	6
Average valuation per steer to start	$	79 25
Average value price per steer at finish		124 64
Average increase in value		45 39
Average cost of feed per steer		45 45
Amount of meal eaten per lot of 7 steers	lbs.	15,066
Amount of ensilage and roots eaten	"	53,514
Amount of hay eaten	"	12,517
Amount of green feed eaten	"	8,414
Amount of straw eaten	"	4.754

Meal consisted of bran 8,488·5 lbs.; gluten 3,906·5 lbs.; oil cake 2,671 lbs. Roughage was clover hay, corn ensilage, turnips, mangels and oat straw. Roots were fed during the winter months only and in varying proportions with the ensilage.

Lot 4.

The steers in this lot were yearlings of Angus breeding, and when put on feed in November, 1911, were in comparatively poor flesh, but thrifty. They were not heavily fed and were marketed in November, 1912 in fair condition.

Number of steers in lot		3
First weight, gross, November 30, 1911	lbs.	2,640
First weight, average	"	880
Finished weight, gross, March 29, 1912	"	3,410
Finished weight, average	"	1,136·6
Total gain in 141 days	"	770
Average gain per steer	"	256·6
Daily gain per steer	"	1·82
Daily gain per lot 3 steers	"	5·46
Gross cost of feed	$	54 81
Cost of 1 lb. gain	cts.	7·1
Value of beef November 9, 1911,—2,640 lbs. at 5½ cents.	$	145 20
Total cost to produce beef		200 01
Selling price 3,410 lbs. at 6¾ cents per lb. less 5 per cent shrinkage		218 67
Profit		18 66
Profit per steer		6 22
Average valuation per steer to start		48 40

Average value price per steer at finish, March 29, 1912		72 89
Average increase in value		24 49
Average cost of feed per steer		18 27
Amount of meal eaten per lot of 3 steers	lbs.	2,493
Amount of ensilage and roots eaten	"	9,795
Amount of hay eaten	"	2,805
Amount of straw eaten	"	1,400

SHEEP.

We have to report just a fair year with the breeding sheep. The crop of lambs in the spring was good, and until midsummer both sheep and lambs were in the best of thrift. They were necessarily limited to a small acreage of pasture, and this proved their undoing. They became infested with tape worms, and though they were promptly treated for same, it left them in a greatly reduced condition, and very considerably diminished our returns for the year.

We had thought, and so reported, that the adoption of a short rotation might enable us to continue our flocks with fair success, but last year's experience seems to demonstrate the futility of trying to raise sheep with any degree of profit on such a small pasture area as has heretofore been available.

EXPERIMENT IN FATTENING LAMBS.

To determine the relative value of roots and corn silage as a succulent feed for fattening lambs, a third experiment similar in outline to those conducted in 1910 and 1911, has been carried on.

Grade wethers of mixed breeding were used, which when put on feed in December were about seven months of age.

They were divided into three lots of ten in each lot.

For two weeks they were all fed on clover hay only at the rate of three pounds per head per diem.

After this preparatory period the feeding was as follows:—

Each lamb of each lot received 8 ozs. per diem during the first week and gradually increasing amounts up to 22 ozs. per diem during the fourteenth week of a meal mixture constant in composition: 400 lbs. bran, 200 lbs. oats and 100 lbs. nutted oil cake.

As roughage, lot 1 were given turnips, lot 2 ensilage and lot 3 turnips and ensilage, equal parts, and of clover hay each lamb in each lot received 1⅓ lbs. per day.

It was aimed to feed as much turnips and ensilage as the animals would consume without inducing scouring. Seven pounds per lamb per diem was the maximum quantity of turnips and of the mixture of turnips and ensilage, consumed, whereas five pounds of ensilage per lamb per diem was as much as they would eat up clean.

All lambs remained in good health throughout the test, but one animal in lot 2 had some trouble with its teeth, which so affected its progress that it was decided to leave it out of consideration in computing the results.

In calculating the cost of feeding the following prices were charged:—

	Per ton.
Roots and ensilage	$ 2 00
Clover hay	7 00
Bran	22 00
Oats	25 00
Nutted oil cake	35 00

TABLE 1.—Lamb Feeding Experiment.

(Turnips *vs.* Corn Ensilage *vs.* Turnips and Corn Ensilage as Succulent Feed for Fattening Lambs).

Lot.		No. 1.	No. 2.	No. 3.
Numbers of lambs in lot		10	9	10
Number of days in experiment		114	114	114
Total weight at beginning of experiment	Lbs.	1,033	912	1,033
Total weight at end of experiment	"	1,355	1,195	1,376
Gain during period	"	322	283	343
Gain per head	"	32·2	31·4	34·3
Gain per head per day	"	·28	·27	·30
Quantity of meal eaten by lot during period	"	1,085	976·5	1,085
Quantity of clover-hay eaten by lot during period	"	1,768	1,591	1,768
Quantity of turnips eaten by lot during period	"	6,300	.....	3,150
Quantity of corn ensilage eaten by lot during period	"	.....	4,063	3,150
Total cost of feed	$	25.89	21.69	25.89
Cost of feed per head	"	2.59	2.41	2.59
Cost of feed per head per day	Cts.	2·27	2·11	2·27
Cost to produce one pound gain	"	8·04	7·66	7·55
Original cost of sheep	$	59.40	52.44	59.40
Original cost of sheep plus cost of feed	"	85.29	74.13	85.29
Selling price at $7.25 per 100 lbs	"	98.24	86.63	99.76
Net profit on lot	"	12.95	12.51	14.47
Net profit per lamb	"	1.29	1.39	1.45

Lamb Feeding Experiment.

(Average result of three tests of Turnips *vs.* Corn Ensilage *vs.* Mixture of Turnips and Ensilage as Succulent Feed for Fattening Lambs).

Group.		No. 1.	No. 2.	No. 3.
Number of lambs in group		28	27	29
Average number of days in the experiment		109	109	109
Total weight at beginning of experiment	Lbs.	2,886	2,766	2.887
Total weight at end of experiment	"	3,673	3,574	3,722
Gain during period	"	787	808	835
Gain per head	"	28·1	29·9	28·8
Gain per head per day	"	·26	·27	·26
Quantity of meal eaten by group during period	"	3,064	2955·5	3,167
Quantity of turnips eaten by group during period	"	13,257	.....	7,196
Quantity of corn ensilage eaten by group	"	145	9,725	6,538
Total cost of feed	$	69.45	62.87	70.13
Cost of feed per head	"	2.48	2.33	2.42
Cost of feed per head per day	Cts.	2·27	2·14	2·23
Cost to produce one pound gain	"	8·82	7·78	8·40
Original cost of sheep	$	163.96	157.05	164.62
Original cost of sheep plus cost of feed	"	233.41	219.92	234.15
Selling price	"	269.34	262.30	273.02
Net profit on lot	"	35.93	42.38	38.87
Net profit per lamb	"	1.28	1.57	1.34

The figures in the above tables indicate corn ensilage to be of high value for fattening lambs, the average net profit per lamb covering three years' experiments being $1.28 for the turnip-fed lots as against $1.57 for the lots getting silage, and $1.34 for the lots on a mixture of turnips and ensilage.

TABLE 2.—Lamb Feeding Experiment.

(Some findings in connection therewith).

Lot.	No. 1.	No. 2.	No. 3.
Meal required to produce one pound increase in live weight..... Lbs.	3·37	3·45	3·16
Hay (clover) " " " ..... "	5·49	5·62	5·15
Roots (turnips) " " " ..... "	19·57	.....	9·18
Ensilage (corn) " " " ..... "	.....	14·36	9·18
Dry matter " " " ..... "	8·71	10·43	9·55
Digestible matter " " " ..... "	6·05	6 67	6·32
Nutritive ratio of meal ration	1:3·8	1:3·8	1:3·8

SWINE.

SUMMARY OF PIGGERY OPERATIONS, 1911-12.

Total sales during year..	$ 3,200 27	
Value of manure produced..	200 00	
Value of pigs on hand, April 1, 1912..	4,407 25	
		$7,807 52
Cost of feed and bedding during year..	$ 2,206 40	
Cost of labour..	970 00	
Value of stock on hand April 1, 1911.. ..	4,371 20	
		7,547 60
Profit for one year..		$ 259 92

PIG FEEDING EXPERIMENTS.

Meal *vs.* meal and milk *vs.* meal and pulped turnips cooked, *vs.* meal and pulped turnips raw *vs.* meal and pulped mangels raw.

In this comparison of feeds for fattening swine, two tests were made, the first being the average of a triplicate test with five lots of five in each lot, and extending over a period of 56 days, the second comprising five lots of five in each lot, and extending over a period of 112 days.

The meal mixture was made up of:—

200 lbs. ground barley.
200 lbs. shorts.
100 lbs. ground oats.

and in each case was mixed, equal parts, with the other ingredient of the ration.

In both tests the different lots were fed as follows:—

Lot 1.—Meal mixture and water only.
Lot 2.—Meal mixture and milk.
Lot 3.—Meal mixture and pulped turnips, cooked.
Lot 4.—Meal mixture and pulped turnips, raw.
Lot 5.—Meal mixture and pulped mangels, raw.

In computing results foodstuffs were charged for at the following rates:—

Meal mixture..	$ 1 20 per 100 lbs.
Skim-milk..	0 20 per 100 lbs.
Mangels and turnips..	2 00 per ton.

The following tables contain the details of the experiments, the outstanding point in both of which is the great value of skim-milk for fattening hogs.

TEST 1.—Pig Feeding Experiment.

Feeds Given.		Meal and Water.	Meal and Milk.	Meal and pulped Turnips, cooked.	Meal and pulped Turnips, raw.	Meal and pulped pulped Mangels, raw.
Number of pigs in lot		15	15	15	15	15
Total weight at beginning of experiment November 21, 1911	Lbs.	1,560	1,406	1,207	1,343	1,552
Average weight	"	104	93·7	80·4	89·5	103·4
Total weight at end of experiment January 16, 1912	"	2,170	2,139	1,699	1,744	2,103
Average weight	"	144·6	142·6	113·2	166·2	140·2
Gain per lot in 56 days	"	610	733	492	401	551
Gain per pig in 56 days	"	40·6	48·8	32·8	26·7	36·7
Average gain per pig per day	"	·72	·87	·58	·42	·65
Amount of meal consumed	"	2,630	2,625	1,809	1,518	2,179
Amount of roots or milk consumed	"	.....	2,025	1,869	1,518	2,179
Total cost of feed for period	$	31 56	28 35	23 50	19 72	28 31
Cost of 1 lb. gain live weight	cts.	5·1	3·8	4·7	4·9	5·1

TEST 2.—Pig Feeding Experiment.

Feeds Given.		Meal and Water.	Meal and Milk.	Meal and pulped Turnips cooked.	Meal and pulped Turnips, raw.	Meal and pulped pulped Mangels, raw.
Lot.		1	2	3	4	5
Number of pigs in pen		5	5	5	5	5
Total weight at beginning of experiment November 21st, 1911	Lbs.	441	384	275	359	465
Average weight at beginning of experiment	"	88·2	76·8	55	71·8	93
Total weight at end of experiment	"	779	833	510	648	801
Average weight at end of experiment	"	155·8	166·6	102	129·6	160·2
Gain per pen in 112 days	"	338	449	235	289	336
Gain per pig in 112 days	"	67·6	89·8	47·0	57·8	67·2
Average gain per pig per day	"	6	·8	·42	·51	·60
Amount of meal consumed	"	1,430	1,189	920	1,090	1,394
Amount of roots or milk consumed	"	.....	1,189	920	1,090	1,394
Total cost of feed for period	$	17 16	16 63	11 96	14 17	18 11
Cost of 1 lb. gain live weight	cts.	5·0	3·7	5·1	4·9	5·3

FINANCIAL STATEMENT.

Below are submitted inventories and returns from the various classes of live stock under my charge during the year April 1, 1911 to March 31, 1912.

Class.	April 1, 1911.		April 1, 1912.		Returns.	Gross returns made up of increase in value of products and value of animals sold.
	No.	Value.	No.	Value.	Value.	
		$ cts.		$ cts.	$ cts.	$ cts.
Horses	18		18			3,765 72
Breeding cattle	139	17,650 00	98	17,155 00	13,824 29	13,329 29
Steers	19	1,369 00	29	1,139 76	2,013 84	1,784 60
Sheep	88	1,139 00	59	845 00	771 55	477 55
Swine	174	4,371 20	193	4,407 25	3,200 27	3,236 42
Total	438	24,529 20	397	23,547 01	19,809 95	22,593 48

SUMMARY OF LIVE STOCK OPERATIONS.

Returns.

Gross returns from animals of all classes, including value of products, value of service and increase in value of young stock	$22,593 48
Manure, 1,500 tons at $1 per ton	1,500 00
	$24,093 48

EXPENDITURE—VALUE OF FOOD CONSUMED.

Meal, grain, etc., (market price)	$ 5,470 10
Hay at $7 per ton	921 58
Roots, ensilage at $2 per ton	1,186 20
Green feed at $3 per ton	204 57
Whole milk at $1 per 100 lbs	144 96
Skim milk at 20 cents per 100 lbs	416 91
Straw at $5 per ton	810 00
Total	$ 9,154 32

Cost of labour in connection with care of horses, cattle, sheep and swine:—

Herdsman	$ 720 00
One man	600 00
Four men	2,112 00
One man	500 00
Extra help, teaming, etc	230 00
	$ 4,162 00
Total expenditure	13,316 32
Balance	10,777 16
Less cost of new stock purchased, 1911-12	7,655 53
Net balance	$ 3,121 63

SUMMARY OF FARMING AND LIVE STOCK OPERATIONS ON 200-ACRE FARM, 1911.

Returns.

Total value of returns from fields	$ 5,478 90
Total value of returns from live stock	24,093 48
Total returns	$ 29,572 38

Expenditure.

Total cost of field operations	$ 2,858 90
Total cost of live stock operations	13,316 32
Expended, buying stock	7,655 53
Total expenditure	$23,830 75
Balance	5,741 63

COMPARATIVE Statement of Crops on '200 Acre Farm,' from 1899 to 1911 inclusive. (200 Acre Farm includes 7 Acres of Roads.)

YEAR.	GRAIN.		HAY.		ROOTS AND CORN.		PASTURE.		SOILING CROP.		PIG PASTURE.		Remarks.
	Area in Acres.	Yield in Pounds.	Area in Acres.	Yield in Tons.	Area in Acres.	Yield in Tons.	Area in Acres.	Number of Cattle.	Area in Acres.	Disposition of Crops.	Area in Acres.	Crops Grown for Pasture.	
1899.....	73	118,466	39	93	40	326½	40	36	1	Fed to dairy cows	....	....	Generally considered a good year for all crops.
1900.	80	126,621	53	138	40	743	20 and aftermath.	49	....	....	....	.....	Season very favourable for most crops.
1901.....	79	114,472	58	210	40	702	16 and aftermath.	52	....	.....	.	....	" " "
1902.....	74	144,914	60	216	39	665	20 and aftermath.	62	.	....	5	Clover, rape and aftermath.	Season favourable for hay, bad for corn.
1903	69	126,619	62	154	34	473	16 and aftermath.	96	5	Dairy cows, bulls and calves.	6	Clover and rape.	Season very unfavourable for most crops, particularly adverse to corn and roots. No second crop hay.
1904	67	112,009	60	192	46¾	674	13·75	98	3	" " ..	3	" " ..	Season unfavourable for grain and corn, good for hay and roots.
1905	66	111,932	59	258	47	971½	14 and aftermath.	100	5	All cattle ensilage fed.	4	Clover, rape, mixed crop, peas, roots and alfalfa.	Season favourable for hay, corn and roots, too wet for grain on mucky land.
1906.....	69	125,516	62	140	48	774½	14	105	5	" " ..	3	" " ..	Very bad season. Meadows winter killed. Summer too dry.
1907.....	61	102,494	73	227	46	704	13·75	110	5	" " ..	3	" " ..	Bad hay year. Grain fair. Corn and roots poor.
1908.....	61	63,003	62	175	49	670	14	120	5	" " ..	3	" " ..	Very bad year for all classes of crops. Too dry.
1909	65	106,572	57	142	49	878	14	142	5	" " ..	3	" " ..	Bad hay year. Grain fair. Corn and roots good.
1910.....	59	110,128	60	190	53	880	14	160	5	" " ..	3⅓	" " ..	Fairly good year for all crops.
1911.....	67	146,490	54	190	57	749	16·5	143	2·8	" " ..	2·8	" " ..	Good year for grain and hay. Corn and roots rather poor.

Of the area indicated as having been used as pasture for swine in 1905, 3 acres yielded a crop of green feed for soiling cattle before being given over to swine. Cattle were pastured on roads where possible. A small rough field not included in '200 Acre Farm' is used as partial pasture and run for about 20 head of young stock. These cattle receive ensilage or other succulent food every day, and meal at the rate of about 1½ lbs. each day part of the time.

The variety of crops grown and the varying areas under each crop each year, make it quite difficult to make a comparison of the returns of the different years, so to simplify matters I would suggest that a fixed valuation be put upon the products and the return of each year valued accordingly.

Fixing prices as follows:—Grain, $1 per 100 lbs.; roots and ensilage, $2 per ton; hay, $7 per ton; summering cattle, $8 per season, and an area used as pasture for pigs, $15 per acre, the returns from the '200-acre farm' for the years mentioned may be said to have been worth $2,776.66 in 1899, $4,110.21 in 1900, $4,434.72 in 1901, $4,787.14 in 1902, $4,148.19 in 1903, $4,741.09 in 1904, $5,714.32 in 1905, $4,669.16 in 1906, $4,931.94 in 1907, $4,631.33 in 1908, $5,502.15 in 1909, $5,521.28 in 1910, and $5,478.90 in 1911.

REMARKS ON ROTATION EXPERIMENTS.

The true farmer will ever have two objects in view when managing his farm: to so manage as to increase gradually but surely the margin of profit and, at the same time, to render his farm more productive. Many factors must necessarily unite to produce such desirable results, but of one feature we may be certain, there will be followed on such a farmer's farm a regular rotation of crops, for no other single practice in farm management can compare with this in importance. The rotation or rotations adopted will, of course, depend upon the line of farming followed, and to some extent upon the character of the soil and the physical peculiarities of the farm as a unit, but a rotation there will be.

Crop rotation means a certain succession of crops which regularly repeats itself each time the course is run. It really means further that the crops follow each other in such order as to insure each having such supplies of plant food of such a character as to aid in securing good returns from each particular crop.

Hence, in arranging a rotation, it is very necessary to have some knowledge of the food requirements of different crops and to know something of the values of the residues from the different crops included. Certain forage crops, such as corn, roots, potatoes and hay require an immense amount of food for stem, leaf and root production—that is an abundance of nitrates as is found in clover or other sod turned down and in well-manured lands. Other crops, such as cereals, can get along best with a lighter supply of nitrates, but need more phosphates, hence do well after some forage crop has taken up the superabundance of free nitrates found after sod. It is evident, therefore, that a good rotation will include (1) meadow or pasture, (2) roots or corn, and (3) some cereal crop.

Various combinations of these three classes are possible, and the natural aim of experimental work will be to determine (1) the comparative values of rotations as soil improvers, and (2) their relative suitability for different lines of farming.

Five or six years' experience with a rotation of five years' duration showed such remarkable results here, that, in 1904, it was decided to begin an experiment that would include a variety of rotations.

Rotation 'A.'

First year.—Land ploughed in August, well worked, ribbed in October; seeded next spring to oats, and 10 lbs. clover sown per acre; allowed to grow one year and turned under as fertilizer for corn.

Second year.—Corn, manure applied in winter or spring, 25 tons per acre; shallow ploughed, corn planted.

Third year.—Grain, seeded down, 8 lbs. red clover, 2 lbs. alsike, 10 to 12 lbs. timothy per acre.

Fourth year.—Clover hay, two crops expected.

Fifth year.—Timothy hay.

Rotation 'B.'

First year.—Grain, land ploughed previous autumn. Seeded down 10 lbs. red clover, 2 lbs. alsike, 5 lbs. timothy per acre.

Second year.—Clover hay, two crops expected.

Third year.—Corn, manured in winter, 20 to 25 tons per acre; spring ploughed.

Fourth year.—Grain, seeded down, red clover 10 lbs. alsike 2 lbs. and 5 lbs. timothy per acre. Land fall-ploughed after corn; very shallow furrow.

Fifth year.—Clover hay, two crops; late fall ploughed.

Rotation 'E.'

First year.—Manured and handled as 'Z.'

Second year.—Oats, seeded down, 10 lbs. red clover, 6 lbs. alfalfa, 2 lbs. alsike, 6 lbs. timothy per acre.

Third year.—Pasture. Cattle.

Rotation 'Z.'

First year.—Manure, 12 to 15 tons per acre, applied winter; shallow ploughed in spring; well worked and planted to corn.

Second year.—Oats, seeded down, 10 lbs. red clover, 2 lbs. alsike, 6 lbs. alfalfa and 6 lbs. timothy per acre.

Third year.—Clover hay; two crops expected.

Rotation 'S.'

Shallow ploughing; deep cultivation by means of stiff tooth cultivator or subsoiler.

First year.—Roots or corn, ploughed August, 4 inches deep; manure 15 to 20 tons per acre; work at intervals, ridge up in fall, sow to roots in spring.

Second year.—Grain, seeded down, 10 lbs. red clover, 12 lbs. timothy per acre.

Third year.—Clover hay.

Fourth year.—Timothy hay.

Rotation 'D.'

Deep ploughing; plough August, 7 inches deep; manure 15 to 20 tons per acre; work with cultivator at intervals. Land ploughed late autumn, 7 inches; roots or corn next spring.

Second, third and fourth year.—Same as 'S.'

Rotation 'H.'

First year.—Manured in fall and manure ploughed in, well worked; sown to roots next spring.

Second year.—Different grain mixtures suitable for feeding green. Different grass seed mixtures suitable for pasture and soiling next year.

Third year.—Pasture. Swine.

Rotation 'T.'

Sheep pasture.

Crops just as in 'H' save that various mixtures of grain and grass seed are used to test their value for sheep feeding and pasturing.

Rotation 'A' Fertilizer.

Using barn-yard manure only. Four years' duration. Roots, grain, hay, hay. Barn-yard manure 15 tons per acre for roots.

Rotation 'B' Fertilizer.

Commercial fertilizer but no barn-yard manure. Four years' duration. Roots, grain, hay, hay. Commercial fertilizer: 300 lbs. superphosphate; 75 lbs. muriate of potash; 100 lbs. nitrate of soda, before sowing to roots. Each other year 100 lbs. nitrate of soda only.

Rotation 'C' Fertilizer.

Half usual dressing barn-yard manure and commercial fertilizer besides. Four years' duration. Roots, grain, hay, hay. Barn-yard manure 7½ tons per acre for roots; commercial fertilizer at same time, 150 lbs. superphosphate; 37½ lbs. muriate of potash and 50 lbs. nitrate of soda. Besides, 100 lbs. nitrate of soda each year in hay or grain.

RETURNS PER ACRE.

To compare results under such varied crop and cultural conditions is a rather difficult matter. The plan adopted has been to place an arbitrary and uniform valuation on all products and on pasturing various classes of stock. Following this plan, the returns per acre have been about as follows, the average of six years' work, save in case of rotation 'T' which is for one year only, and fertilizers 'A,' 'B' and 'C,' which are for two years.

Rotation 'A.'

Average value of crop per annum—$23.08.

Rotation 'B.'

Average value of crop per annum—$23.61.

Rotation 'E.'

Average value of crop per annum—$21.24.

Rotation 'Z.'

Average value of crop per annum—$25.43.

Rotation 'S.'

Average value of crop per annum—$25.38.

Rotation 'D.'

Average value of crop per annum—$25.63.

Rotation 'H.'

Average value of crop per annum—$28.35.

Rotation 'T.'

Average value of crop per annum—$19.92.

Rotation 'A' Fertilizer.

Average value of crop per acre—$25.51.

Rotation 'B' Fertilizer.

Average value of crop per acre—$25.22.

Rotation 'C' Fertilizer.

Average value of crop per acre—$27.65.

PROFITS PER ACRE.

The values placed on products were: Roots or silage stored, $2 per ton; soiling crops, $3 per ton; hay, $7 per ton; grain, $1 per 100 lbs.; oat straw, $4 per ton; pasturing cows, $1 per month. Sheep and swine pastured one cent per day.

In estimating cost of operation, labour is charged at prices paid, machinery is put at 30 cents per acre, rent at $3 per acre and manure at $3 per acre.

The average net profits, after paying all expenses, were as follows per acre:

'A' net profit per acre	$9 04
'B' " "	9 22
'E' " "	7 59
'Z' " "	9 62
'S' " "	8 11
'D' " "	8 10
'H' " "	8 32
'T' " "	5 50
'A' Fertilizer net profit per acre	8 15
'B' Fertilizer " "	5 66
'C' Fertilizer " "	9 02

VALUE OF DIFFERENT ROTATIONS.

A study of the various rotations would lead one to remark upon them briefly as follows:—

Rotation 'A.'—This rotation has been in use here for 13 years and has proven to be most excellent where carefully followed and cultural operations well performed. Where all land was under cultivation, it would be found necessary to devote a certain area to soiling crops. It might be extended to six years by leaving down to pasture for two years instead of one.

Rotation 'B.'—This rotation has been fairly successful here, but, for certain reasons not easily enumerated, I do not feel as though I could either criticise or praise as yet and feel sure of my ground.

Rotation 'E.'—This rotation would not be suitable for the average farmer but might suit the man who had to buy rough forage.

Rotation 'Z.'—This would be a most excellent rotation to put into practice where sufficient rough land was available to serve as pasturage. It is the rotation that would most likely supply the greatest amount of forage of the best description for dairying or beef production. It is better suited for heavy than for light soils.

Rotation 'S.'—This is a rotation that has been in use for a number of years on the Agricultural College Farm at Guelph, where it has given satisfactory results. It is possibly open to the criticism of having too small a proportion of land under grain. Where live stock is, however, the mainstay, this is a very minor fault. The turning of a shallow furrow when ploughing sod has been found to be good practice here when preparing for grain or corn. In preparing for roots, the regular plough with sub-soiler is to be advised.

Rotation 'D.'—This rotation is the same as rotation 'S' so far as crops are concerned. The results so far obtained show the advantage in favour of either shallow ploughing and deep cultivation or deep ploughing.

Rotation 'H.'—The area devoted to pigs (some 10 acres) where this rotation is followed has given very satisfactory returns, and would, I feel confident, prove profitable to any one who followed it carefully.

Rotation 'T.'—Sheep. The returns from this rotation are not strictly comparable with those from others, since many side experiments materially affect the results.

THE ROTATIONS IN 1911.

The experiment to determine the values of the different rotations as discussed above is being followed up, and below the detailed report of the labour on each plot and the return therefrom, will be found some brief notes on each field and on the rotation as a whole.

The rotations are as follows:—

Rotation 'A.'—Five years. Clover hay, timothy hay, grain, corn, grain.

Rotation 'B.'—Five years. Clover hay, grain, clover hay, corn, grain.

Rotation 'E.'—Three years. Pasture, corn, grain.

Rotation 'Z.'—Three years. Clover hay, corn, grain.

Rotation 'S.'—Four years. Shallow ploughing, clover hay, timothy hay, roots, grain.

Rotation 'D.'—Four years. Deep ploughing, clover hay, timothy hay, roots, grain.

Rotation 'H.'—Three years. Hog pasture, roots, grain or soiling crops.

Rotation 'T.'—Three years. Sheep pasture, roots and soiling crops, grain.

Rotation 'A'. Fertilizer.—Four years. Roots, grain, hay, hay. (Barn-yard manure).

Rotation 'B' Fertilizer.—Four years. Roots, grain, hay, hay. (Commercial fertilizer).

Rotation 'C' Fertilizer.—Four years. Roots, grain, hay, hay. (Commercial fertilizer and barn-yard manure).

In the description of the rotations and fields that follows an effort is made to give as concisely as possible the location of each field, its size, the character of its soil, its drainage and its general crop history.

In the tables will be found all items of expenditure. The manure is applied in the same ratio to each field in each rotation. To illustrate: If to the corn land in rotation 'Z,' 15 tons of manure per acre is applied, this is equivalent to 5 tons per

acre per annum, as 'Z' is a three-year rotation. Then, in applying manure to 'B' 25 tons would be applied, as 'B' is a five-year rotation. Since manure must vary in quantity each year, $3 per acre per annum is charged in each rotation.

COMPARATIVE VALUES OF ROTATIONS ON STOCK FARMS.

Supposing the average animal of the bovine species to consume 2,000 lbs. hay, 6 tons ensilage and roots, 1 ton straw, 4 months' pasture and 1,000 lbs. meal in a year, this would amount to about $37 or $38 as the cost of feeding an animal for a year. Keeping these figures in mind, the stockman can form some idea of the comparative values of the different rotations for live stock farming.

ROTATION

Lot.	Location.	Description of Soil.							Area in acres.	Crops.		Items of	
		Sand.	Sandy loam.	Clay loam.	Clay.	Black muck.	Gravel.	Hard pan.				Rent and manure.	Seed, twine and use of machinery.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1910.	1911.	$ cts.	$ cts.
A1	W.S. 3	30	45	....	....	25	....	....	9·96	Grain	Corn	59 76	17 14
A2	L.S. 1	30	65	5	....	....	....	....	8·90	Hay	Grain	53 40	14 07
A3	A.S. 14	10	15	20	20	15	....	20	10·20	Corn	Grain	61 20	16 56
A4	W.P.G.S.1 F.S. 1	70	20	10	....	....	....	....	8·85	Hay	Hay	53 10	11 50
A5	....	....	35	30	10	15	10	....	8·56	Grain	Hay	51 36	11 12
		Aggregate							46·47			278 82	70 39
		Average per acre, 1911										6 00	1 51
		Average for 7 years										6 00	1 55

ROTATION

B 1	W.S. 4	5	35	5	50	5	....	....	10·00	Grain	Hay	60 00	13 00
B 2	L.S. 2	20	70	....	5	5	....	....	8·82	Grain	Hay	52 92	11 46
B 3	A.S. 15	20	60	5	....	15	....	....	10·20	Hay	Corn	61 20	18 06
B 4	W.P.G.S.2	20	60	15	....	5	....	....	9·15	Hay	Grain	54 90	23 20
B 5	F.S. 2	....	30	30	40	....	....	....	8·93	Corn	Grain	53 58	14 40
		Aggregate							47 10			282 60	80 12
		Average per acre, 1911										6 00	1 70
		Average for 7 years										6 00	1 53

Rotation 'A.'

This rotation of five years' duration includes grain, hay (two years), grain and corn or roots, in order named. The grain crop mentioned first, comes after corn. With the first crop of grain is sown 10 lbs. red clover, 1 lb. alsike and 10 lbs. timothy per acre. The field is left in hay for two years; then in August of the second year it is ploughed and cultivated at intervals till October, when it is ridged up and left till next spring. Oats are sown on this field, and with them red clover seed at the rate of 10 lbs. per acre. This clover is allowed to grow for something over a year, or until corn seeding time the following spring, when it is turned under with a shallow furrow along with the manure that will have been applied during the winter. After the corn has been harvested, the land is ploughed shallow and left till next spring.

The crops on this rotation have been fairly satisfactory this year.

'A 1' returned a fair crop of corn. 'A2' and 'A3' yielded splendid crops of grain. 'A4' and 'A5' grew heavy crops of hay.

SESSIONAL PAPER No. 16

"A."

Expense in Raising Crop of 1911.								Particulars of Crop in 1911.						
Manual Labour.		Horse Labour.												
Hours.	Cost of manual labour.	Hours with single horse.	Hours with team.	Value of horse labour.	Threshing.	Total cost.	Cost for one acre.	Grain.	Straw.	Hay.	Roots, ensilage and soiling crops.	Total value.	Value of crop per acre.	Profit per acre in 1911.
No.	$ cts.	No.	No.	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
262	43 23	24	176	62 43	.....	182 56	18 32	.....	.....	.....	229,610	229 61	23 05	4 73
47	7 75	3	115½	43 59	14 75	133 56	15 00	17,360	28,820	.....	.....	231 24	25 97	10 97
74	12 21	4	78½	28 66	20 45	139 08	13 63	24,060	35,450	.....	.....	311 50	30 53	16 90
129	21 29	20½	60	23 13	.....	109 02	12 31	.....	.....	44,540	.....	155 89	17 61	5 30
90	14 85	16½	48½	18 68	.....	96 01	11 21	.....	.....	64,800	.....	226 80	26 49	15 28
602	99 33	68	478½	176 49	35 20	660 23	.....	41,420	64,270	109,310	229,610	1,155 04	.....	.....
12·9	2 13	1·4	10·2	3 80	0 75	...	14 20	891	1,383	2,352	4,941	.....	24 85	10 65
14 1	2 24	3·7	10·1	4 10	0 39	.....	14 43	666	848	1,962	5,970	.....	23 08	9 04

"B."

113	18 65	13	46½	17 20	....	108 85	10 88	.....	.....	90,010	.....	315 03	31 50	20 62
83	13 69	11½	41	15 17	.....	93 24	10 57	.....	.....	52,120	.....	182 42	20 68	10 11
36	60 39	18	203	70 59	.....	210 24	20 61	....	...	.....	267,590	267 59	26 23	5 62
61	10 07	4	93	33 22	17 46	138 85	15 17	20,544	29,000	.....	.....	263 44	28 79	13 62
53	8 75	3	84	30 27	15 05	122 05	13 66	17,708	25,052	.....	.....	227 18	25 44	11 78
676	111 55	49½	467½	166 45	32 51	673 23	.....	38,252	54,052	142,130	267,590	1,255 66	.....	.....
14·;	2 36	1·0	9·9	3 53	0 69	. ...	14 29	812	1,147	3,017	5,681	.....	26 65	12 36
12·9	2 46	4·1	9·6	4 20	0 38	.....	14 63	618	978	2,573	5,963	....	23 61	9 22

Rotation 'B.'

This rotation of five years' duration includes grain, hay, grain, hay and corn or roots in the order named, the first crop of grain following a crop of corn or roots. Red clover, 10 lbs., alsike, 1 lb. and timothy, 5 lbs., is sown with grain each time. When grain follows hay, the land is ploughed in the early fall. When corn follows hay the land is ploughed in the spring, the spring growth of grass and clover being ploughed in along with the manure which will have been applied during the preceding winter.

The crops on this rotation were fairly satisfactory.

'B 1' and 'B 2' yielded heavily of hay. On 'B 3' just a fair crop of corn was harvested. The grain on both 'B 4' and 'B 5' was very good.

ROTATION

Lot.	Location.	Description of Soil.							Area in Acres.	Crops.		Items	
		Sand.	Sandy loam.	Clay loam.	Clay.	Black muck.	Gravel.	Hardpan.				Rent and manure.	Seed, twine and use of machinery.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1910.	1911.	$ cts.	$ cts
E 1	W. S. 1	40	40	....	..	15	5	....	14·00	Corn..	Grain.....	84 00	24 00
E 2	L. S. 4	10	60	....	10	20	....	....	18.00	Pasture	Corn.	108 00	29 80
E 3	Morn...	30	60	....	5	....	5	....	13.80	Grain.....	Pasture....	82 80	13 80
	Aggre gate								45·80	.. ....	....	274 80	67 60
	Average per acre in 1911									... .	....	6 00	1 47
	Average for 7 y ears									....	....	6 00	1 70

ROTATION

Z 1	W. S. 2	40	40	....	....	15	5	....	6·00	Corn.	Grain	36 00	9 60
Z 2	L. S. 3	10	60	10	....	20	....	....	5·81	Hay.....	Corn.....	34 80	9 75
Z 3	Obs.....	10	60	20	10	....	....	....	4·20	Grain	Hay.	25 20	5 46
	Aggregate								16·01			96 06	24 81
	Average per acre in 1911								.....			6 00	1 54
	Average for 7 years								.....			6 00	1 70

Rotation 'E.'

This rotation of three years' duration includes grain, pasture and corn.

The grain comes after the corn, the stubble of which is treated as described under rotation 'A.' With the grain in the spring is sown 10 lbs. red clover, 2 lbs. alsike, 6 lbs. alfalfa and 6 lbs. timothy seed per acre. If weather permits, the field is pastured slightly in the fall.

After the grain crop the land is pastured, the grass seeding having been done with this object in view. In estimating the value of the returns from this field pasture is charged at $1 per month per cow. At this rate the returns fall very short of what would have been the returns if a hay crop had been harvested, if we may judge by the returns from 'Z.' This rotation and rotation 'Z' were introduced into the list in order to gain some idea as to the difference in returns probable from land pastured and land from which all the crops are harvested. It was expected that the corn crop after the pasture would in a measure make up for the difference in favour of the no-pasture rotation 'Z,' but the returns are on the whole a good deal short of those from 'Z.'

Corn follows the pasture. Manure is applied during the fall and winter and turned under with the growth of clover and grass in the spring.

Oats and hay good, corn just fair on this rotation in 1911.

SESSIONAL PAPER No. 16

"E."

OF EXPENSE IN RAISING CROP IN 1911.								PARTICULARS OF CROP IN 1911.						
Manual Labour.		Horse Labour.												
Hours.	Cost of manual labour.	Single Horse.	Hours with team.	Value of horse labour.	Threshing.	Total cost.	Cost for one acre.	Grain.	Straw.	Hay.	Roots, ensilage and soiling crops.	Total value.	Value of crop per acre.	Profit per acre in 1911.
No.	$ cts.	No.	No.	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
90	14 85	4½	108½	39 85	27 74	190 44	13 60	32,647	48,523	.....	.....	423 51	30 25	16 65
398	65 67	16	260½	100 65	.....	304 12	16 89	.....	.....	.....	468,490	468 49	26 02	9 13
.....	.....	.....	.....	.....	.....	96 60	7 00	.....	.....	.....	.....	138 00	10 00	3 00
488	80 52	20½	369	140 50	27 74	591 16	.....	32,647	48,523	.....	468,490	1,030 00	.....	.....
10·6	1 75	·4	8·0	3 06	0 60	.....	12 90	712	1,059	.....	10,229	.....	22 48	9 58
14·9	1 86	1·8	9·2	5 28	0 42	.....	14 17	588	806	.....	9,337	.....	21 24	7 59

"Z."

38	6 27	....	56	19 08	10 85	81 80	13 63	12,769	14,271	.....	.....	156 23	26 04	12 41
138	22 77	10	106	35 83	.....	103 21	17 76	....	.....	.....	144,150	144 15	24 81	7 05
29	4 79	6	17	6 60	.....	42 05	10 01	.....	.....	30,510	.....	106 78	25 42	15 41
205	33 83	16	179	61 51	10 85	227 06	.....	12,769	14,271	30,510	144,150	407 16	....	.....
							14 18							
12·8	2 11	·9	11·1	3 84	0 67	.....	....	797	891	1,900	9,003	.....	25 43	11 32
13·8	2 31	4·5	9·2	3 83	0 34	.....	13 09	580	785	2,108	9,767	.....	25 43	9 62

Rotation 'Z.'

This rotation of three years' duration includes corn, grain and clover hay in the order named.

Corn comes after the clover hay. The manure is applied during the fall or during the winter and spring, and the clover allowed to grow up through it, so facilitating the turning under of the whole mass of manure, late fall growth and spring growth of clover a few days before the corn is to be sown. The furrow turned is quite shallow, about five inches deep, and the land is then disc-harrowed and the corn sown in rows 42 inches apart. It receives later the usual cultivation and care.

Grain follows corn, the land having been ploughed in the fall. With the grain there is sown 10 lbs. red clover, 2 lbs. alsike, 6 lbs. alfalfa and 6 lbs. timothy seed per acre. The hay is cut twice and the last aftermath allowed to grow up to be turned under the next spring for corn. Such a rotation would be particularly valuable to a farmer having sufficient rough land for pasture, or to one desirous of keeping as many cattle as possible on the land at his disposal, supposing him willing to grow roots and corn.

Good crop of oats and hay, corn only fair.

ROTATION

Lot.	Location.	Description of Soil.							Area in Acres.	Crops.		Items	
		Sand.	Sandy loam.	Clay loam.	Clay.	Black muck.	Gravel.	Hardpan.				Rent and manure.	Seed, twine and use of machinery.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1910.	1911.	$ cts.	$ cts.
S 1	E.P.G.S. 1.	20	80	..	....	....	....	....	2	Hay..	Corn..	12 00	3 40
S 2	E.P.G.S. 3.	20	80	....	....	....	....	....	2	Corn..	Grain ..	12 00	3 30
S 3	E.P.G.S. 5.	30	70	....	....	....	....	....	2	Grain ..	Hay..	12 00	2 60
S 4	E.P.G.S. 7.	60	40	....	....	....	....	....	2	Hay.-	Hay..	12 00	2 60
		Aggregate							8			48 00	11 99
		Average per acre in 1911										6 00	1 48
		Average for 7 years										6 00	1 30

ROTATION

D 1	E.P.G.S. 2.	20	80	....	....	....	....	....	2	Hay..	Corn..	12 00	3 40
D 2	E.P.G.S. 4.	20	80	....	....	....	....	....	2	Corn..	Grain ..	12 00	3 30
D 3	E.P.G.S. 6.	30	70	....	....	....	....	....	2	Grain ..	Hay..	12 00	2 60
D 4	E.P.G.S. 8.	60	40	....	....	....	....	....	1·56	Hay.-	Hay..	9 36	2 02
		Aggregate							7·56			45 36	11 32
		Average per acre in 1911										6 00	1 49
		Average for 7 years										6 00	1 29

Rotation 'S.'

(Shallow Ploughing).

This rotation is of four years' duration and includes grain, two years' hay, roots or corn.

The grain crop follows the hoed crop, the land being ploughed (or cultivated) to a depth of about four inches after the hoed crops are harvested in the fall. With the grain is sown 10 lbs. red clover and 12 lbs. timothy seed per acre. The clover hay is cut twice in the season and the second aftermath left on the field; that is, it is not pastured off as is usually done. In the second hay year, two crops are cut if possible, and the land ploughed in August with a shallow four-inch furrow. If manure is applied before ploughing, a subsoiler is attached to the plough to loosen up the soil to a depth of 8 or 9 inches. If manure is not applied, this end is attained by means of a strong, deep-reaching cultivator after the sod has rotted in the fall or the next spring.

'S 1' returned a fair crop of corn. 'S 2' was under grain which yielded well. 'S 3' and 'S 4' had heavy crops of hay.

SESSIONAL PAPER No. 16

"S"

OF EXPENSE IN RAISING CROP IN 1911.								PARTICULARS OF CROP IN 1911.							
Manual Labour.	Horse Labour.														
Hours.	Cost of manual labour.	Hours with single horse.	Hours with team.	Value of horse labour.	Threshing.	Total cost.	Cost for one acre.	Grain.	Straw.	Hay.	Roots, ensilage and soiling crops.	Total value.	Value of crop per acre.	Profit per acre in 1911.
No.	$ cts.	No.	No.	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
66	10 89	7	49	18 22	....	44 51	22 25	....	....	.....	54,830	54 83	27 41	5 16
9	1 49	....	19	6 57	3 53	26 89	13 44	4,158	6,742	.....	.....	55 06	27 53	14 09
20½	3 38½	3½	9½	3 72½	.....	21 71	10 85	....	.....	16,770	.....	58 69	29 34	18 49
20½	3 38½	2½	7½	2 87½	.....	20 86	10 43	....	.....	11,850	.....	41 47	20 73	10 30
116	19 15	13	85	31 39	3 53	113 97	.....	4,158	6,742	28,620	54,830	210 05	.....	.. ..
34 5	2 39	1·6	10·6	3 92	0 44	...	14 24	519	842	3,577	6,853	.....	26 25	12 01
12·6	5 08	5·0	11·2	5 04	0 24	.....	17 43	561	590	3,085	9,784	.....	25 63	8 11

"D"

66	10 89	7	48	18 49	.....	44 78	22 39	.....	.....	... .	56,340	56 34	28 17	5 78
9	1 49	....	19	6 57	3 67	27 03	13 51	4,323	5,827	.....	.....	54 88	27 44	13 93
20½	3 38½	3½	9½	3 72½	....	21 71	10 85	.....	.....	15,950	.....	55 82	27 91	17 06
17	2 81	2	5½	2 15	.....	16 34	10 47	.....	.....	10,010	....	35 03	22 45	11 98
112½	18 57½	12½	82	30 93½	3 67	109 86	.....	4,323	5,827	25,960	56,340	202 07	.. .	.....
14·8	2 45	1·6	10·8	4 09	0 48	.....	14 53	571	770	3,433	7,452	.....	26 72	12 19
29·8	5 13	4·2	11·7	5 79	0 25	.....	17 68	591	569	3,046	10,026	.....	25 64	8 10

Rotation 'D.'

(Deep Ploughing).

This rotation is of four years' duration and includes grain, two years' hay and corn or roots.

The grain crop follows hoed crop, the land being ploughed to a depth of about seven inches, or cultivated after the hoed crops are harvested in the fall. With the grain is sown 10 lbs. red clover and 12 lbs. timothy seed per acre. The clover hay is cut twice in the season, and the second aftermath left on the field; that is, it is not pastured off as is usually done. In the second hay year two crops are cut if possible, and the land ploughed in August with a deep seven-inch furrow.

From 'D 1' was harvested a fair crop of corn. The grain on 'D 2' was good. 'D 3' and 'D 4' grew excellent crops of hay.

ROTATION

Lot.	Location.	Description of Soil.							Area in Acres.	Crops.		Items of	
		Sand.	Sandy loam.	Clay loam.	Clay.	Black muck.	Gravel.	Hardpan.				Rent and manure.	Seed, twine, and use of machinery.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	p. c.	Ac.	1910.	1911.	$ cts.	$ cts.
H 1	H.S. 1	30	40	20	10	....	....	....	3·35	Pasture	Roots	20 10	4 35
H 2	H S. 2	25	45	20	10	....	....	....	3·15	Roots	Grain	18 90	4 99
H 3	H.S. 3	10	20	50	20	....	....	....	2·85	Grain	Pasture	17 10	2 85
	Aggregate								9·35			56 10	12 19
	Average per acre in 1911											6 00	1 30
	Average for 7 years											6 00	1 12

ROTATION

T 1	S.S. 1	10	90	....	....	....	..	....	2·78	Roots	Soiling crop.	16 68	3 51
T 2	S.S. 2	15	55	....	....	....	30	....	2·78	Soiling crop.	Pasture	16 68	2 78
T 3	S.S. 3	....	50	....	....	..		..	2·78	Pasture	Roots	16 68	3 51
	Aggregate								8·34			50 04	9 80
	Average per acre in 1911											6 00	1 17
	Average for 1 year											6 00	1 32

Rotation 'H.'

(Hog Farm).

This rotation is of three years' duration, and includes soiling crop and pasture in the order named. The land is ploughed late in the fall after it has been manured It is disced the next spring and the roots sown on ridges. The roots receive the usual cultivation and are of varied character, including mangels, sugar mangels, sugar beets and turnips, devoted to pork production for the most part, the surplus being charged to cattle and the returns invested in meal for pig feeding.

The soiling crop field is sown with various crops suitable for feeding to pigs. What is over and above the amount possible of consumption by pigs is charged to the cattle at $2 per ton and the returns used to purchase meal for pork production.

The pasture area is divided into several parts, the seeds being sown, as far as possible, at the same time as the soiling crops the previous year, and not allowed to be eaten too close the first fall, although any good growth is not wasted.

'H 1.'—Returned a fair crop of roots.

'H 2.'—Was under grain and a good crop was harvested.

'H 3.'—This plot was used for pasture.

SESSIONAL PAPER No. 16

"H."

Expense in Raising Crop in 1911.								Particulars of Crop, 1911.						
Manual Labour.	Horse Labour.													
Hours.	Cost of manual labour.	Hours with single horse.	Hours with team.	Value of horse labour.	Threshing.	Total cost.	Cost for one Acre.	Grain.	Straw.	Hay.	Roots and ensilage and soiling crops.	Total value.	Value of crop per Acre.	Profit per acre in 1911.
No.	$ cts.	No.	No.	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
325	53 62	16	73	26 62	.....	104 69	31 25	.....	.....	.....	120,680	120 68	36 00	4 75
24	3 96	....	25½	8 91	6 66	43 42	13 78	7,845	9,625	.....	.....	97 70	31 01	17 23
.....	....	....	.....	.....	.....	19 95	7 00	.....	.....	.....	.....	42 75	15 00	8 00
349	57 58	16	98½	35 53	6 66	168 06	.. .	7,845	9,625	.....	120,680	261 13	.....	.. .
37·3	6 15	1·7	10·5	3 80	0 71	.....	17 97	839	1,029	.....	12,967	.....	27 93	9 95
38·2	4 53	4·6	9 5	4 20	0 22	.....	14 75	263	470	396	17,153	.....	28 35	8 32

"T."

26	4 29	3	36½	12 78	.....	37 26	13 40	.....	.....	.....	44,790	67 18	24 16	10 76
.....	.....	.....	.....	.....	.....	19 46	7 00	.....	...	.....	.....	41 70	15 00	8 00
188	31 02	22	51	16 50	.....	67 71	24 35	.....	.....	.....	75,860	75 86	27 28	2 93
214	35 31	25	87½	29 28	.....	124 43	.....	.....	.....	.....	120,650	184 74	.....	.....
25·6	4 23	2·9	10·4	3·51	.....	.....	14 91	.. .	.....	.....	14,466	.....	22 15	7 23
27·0	4 05	4·2	9·4	3·90	. ...	.....	15 31	.....	.... .	1,440	9,524	.....	19 92	5 50

Rotation 'T.'

(Sheep Farm).

This rotation of three years' duration includes roots, grain and pasture.

The area devoted to sheep farming is rather limited, about 11·03 acres. This area is not included in the '200-acre' farm. The whole area has been for several years devoted to pasturing sheep, but it has been divided into four rather unequal fields, susceptible of further subdivision, and devoted to a rotation considered suitable for sheep.

The root field is devoted to white turnips, swedes, cabbage, kohl rabi, thousand-headed kale, etc. It comes after the pasture, the land being manured and ploughed in the fall.

Grain follows on the root land, and with the grain various clovers and grass seeds are sown to prepare for the ensuing two years. The grain may be harvested or used for soiling crop for sheep. The hay field is expected to give one crop of hay and then be devoted to pasture for lambs as soon as they are weaned.

The pasture field is the field that has been in hay the previous year. Alfalfa, red clover, alsike clover, brome grass (*bromus inermis*) and timothy are the clovers and grasses used.

The crops on this rotation were fair this year.

ROTATION "A"

Lot.	Location.	Description of Soil.							Area in Acres.	Crops.		Items of
		Sand.	Sandy loam.	Clay loam.	Clay.	Black muck.	Gravel.	Hardpan.				Rent and Manure.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.	Ac.	1910.	1911.	$ cts.
A 1	A.S. 2			75					1	Hay	Hay	5 25
A 2	A.S. 5		25	75					1	Hay	Roots	5 25
A 3	A.S. 8			10		90			1	Grain	Hay	5 25
A 4	A.S. 11			20		80			1	Roots	Grain	5 25
	Aggregate								4			21 00
	Average per acre in 1911											5 25
	Average for 2 years											5 25
B 1	A.S. 3		25	75					1	Hay	Hay	7 50
B 2	A.S. 6		5	85		10			1	Hay	Roots	7 50
B 3	A.S. 9					100			1	Grain	Hay	7 50
B 4	A.S. 12			50		50			1	Roots	Grain	7 50
	Aggregate								4			30 00
	Average per acre in 1911											7 50
	Average for 2 years											7 50
C 1	A.S. 4		25	75					1	Hay	Hay	6 60
C 2	A.S. 7			70		30			1	Hay	Roots	6 60
C 3	A.S. 10					100			1	Grain	Hay	6 60
C 4	A.S. 13			30			50	20	1	Roots	Grain	6 60
	Aggregate								4			26 40
	Average per acre in 1911											6 60
	Average for two years											6 60

ROTATION "B"

ROTATION "C"

SESSIONAL PAPER No. 16

FERTILIZER.

Expense in Raising Crop in 1911.								Particulars of Crop in 1911.						
Manual Labour.		Horse labour.												
Hours.	Cost of manual labour.	Hours with single horse.	Hours with team.	Value of horse labour.	Threshing.	Total cost.	Cost for one acre.	Grain.	Straw.	Hay.	Roots, ensilage and soiling crop.	Total value.	Value of crop per acre.	Profit per acre in 1911.
No.	$ cts.	No.	No.	$ cts.	$ cts.	$ cts.	$ cts.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.
5½	91	1	3	1 15	.....	8 61	8 61	.....	.....	5,340	.....	18 69	18 69	10 08
70	11 55	8	21	9 62	.....	27 72	27 72	.....	.....	.....	28,160	28 16	28 16	44
11	1 82	2	6	2 30	.....	10 67	10 67	.....	.....	9,470	.....	33 14	33 14	22 47
6	99	....	9¼	3 27	1 25	12 46	12 46	1,474	2,436	.....	.....	19 61	19 61	7 15
92½	15 27	11	42¼	16 34	1 25	59 46	.....	1,474	2,436	14,810	28,160	99 60	.....	.....
23·1	3 81	2·7	10·5	4·08	0 31	.....	14 86	368	609	3,702	7,040	.....	24 90	10 04
41·5	6 40	3·5	12·1	4 86	0 19	.....	18 18	244	429	2,770	12,726	.....	25 51	8 15

FERTILIZER.

7	1 16	1	3	1 15	.....	11 11	11 11	.....	.....	4,480	.....	15 68	15 68	4 57
71½	11 80	8	14	6 62	.....	27 22	27 22	.....	.....	.....	22,730	22 73	22 73	4 99
12½	2 06	2	6	2 30	.....	13 16	13 16	.....	.....	8,800	.....	30 80	30 80	17 64
8½	1 40	....	9¼	3 27	1 45	15 32	15 32	1,709	2,530	.....	.....	22 15	22 15	6 83
99½	16 42	11	32¼	13 34	1 45	66 81	.....	1,709	2,530	13,280	22,730	91 36	.....	.....
24·8	4 10	2·7	8·0	3 33	0 36	.....	16 70	427	632	3,320	5,682	.....	22 84	6 01
43·7	6 69	3·5	11·2	4 61	0 21	.....	20 42	277	433	2,676	12,948	.....	25 22	5 66

FERTILIZER.

7	1 16	1	3	1 15	.....	10 21	10 21	.....	.....	5,800	.....	20 30	20 30	10 09
72	11 88	8	19	8 12	.....	27 90	27 90	.....	.....	.....	29,970	29 97	29 97	2 07
12½	2 06	2	6	2 30	.....	12 26	12 26	.....	.....	9,360	.....	32 76	32 76	20 50
7½	1 24	.....	8¾	3 12	1 60	14 26	14 26	1,893	2,777	.....	.....	24 48	24 48	10 22
99	16 34	11	36¾	14 69	1 60	64 63	.....	1,893	2,777	15,160	29,970	107 51	.....	.....
24·7	4 08	2·7	9·1	3 67	0 40	.....	16 16	473	694	3,790	7,492	.....	26 87	10 72
42·5	6 57	3·5	11·6	4 73	0 22	.....	19 60	289	462	2,982	13,736	.....	27 65	9 02

'A.'—This rotation is of four years' duration and includes grain, hay two years, roots. The grain follows roots, the land being ploughed or cultivated in the fall after the hoed crop is harvested. With the grain is sown 8 lbs. red clover 2 lbs. alsike and 12 lbs. timothy per acre. The clover hay is cut twice in the season. In the second hay year, two crops are cut if possible. Then the land is manured at the rate of 15 tons, barn-yard manure, per acre, and ploughed in August 5 inches deep, worked at intervals during the autumn and ribbed up in the late fall. The following spring the land is worked into good tilth and sown to roots.

'B.'—This rotation is of four years' duration and includes grain, hay two years, and roots. The grain follows roots or corn, the land being ploughed or cultivated in the fall after the hoed crop is harvested. With the grain is sown 8 lbs. red clover, 2 lbs. alsike and 12 lbs. timothy per acre. The clover hay is cut twice in the season. In the second hay year, two crops are cut if possible. Then the land is ploughed in August 5 inches deep and worked at intervals during the autumn and ribbed up in the late fall. The following spring the land is worked into good tilth and 300 lbs. superphosphate, 75 lbs. muriate of potash and 100 lbs. nitrate of soda is applied before being sown to roots or corn. In addition to the above, the land receives a dressing of 100 lbs. nitrate of soda per acre each year that the field is in hay or grain. This application is given in early spring on the grass and just as the grain is coming through, when under grain.

'C.'—This rotation is of four years' duration and includes grain, hay two years, roots. The grain follows the roots or corn, the land being ploughed or cultivated in the fall after the hoed crop is harvested. With the grain is sown 8 lbs. red clover, 2 lbs. alsike and 12 lbs. timothy per acre. The clover hay is cut twice in the season. In the second hay year, two crops are cut if possible; then the land is manured at the rate of 7½ tons barn-yard manure per acre and ploughed in August 5 inches deep, worked at intervals during the autumn and ribbed up in the late fall. The following spring the land is worked into good tilth and 150 lbs. superphosphate, 37½ lbs. muriate of potash and 50 lbs. nitrate of soda is applied before being sown to roots. In addition to the above the land receives a dressing of 100 lbs. nitrate of soda per acre each year that the field is in hay or grain. This application is given in early spring on the grass and just as the grain is coming through, when under grain.

REPORT OF THE DOMINION HORTICULTURIST

W. T. MACOUN.

OTTAWA, March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the twenty-fifth Annual Report of the Horticultural Division, in which will be found information in regard to its work, the results of some of the experiments which have been conducted, and other matters relating to horticulture in Canada.

CHANGES AND DEVELOPMENTS IN THE HORTICULTURAL DIVISION.

Central Farm.—The work of the Horticultural Division is developing rapidly and this year another Assistant was provided in the person of Mr. F. E. Buck, B.S.A., a graduate of the Macdonald College, P.Q., and a specialist in Landscape Gardening. Mr. Buck's work will consist mainly in experimental work with ornamental plants at the Central Experimental Farm, and assisting in planning the ornamental grounds at the Branch Farms. He will also do whatever other work seems best in promoting a greater love for ornamental plants among Canadians and encouraging the beautifying of farmers' homes.

During the past year some marked changes were made on the ornamental grounds at the Central Farm. The old rose plantation, which had been a prominent object on the main lawn but which had seemed out of place there, was removed and a new rose garden planted where the different varieties will be tested. A herbaceous perennial border 450 feet long and 12 feet wide which had been tiled in the autumn of 1910 for sub-irrigation, was planted in the autumn of 1911 and will be an attractive and conspicuous feature along the northern boundary of the main lawn. The ground about the sample hedges, which had been cultivated in previous years and was unpleasant to walk over when the ground was wet, was seeded down to lawn grass. A strip will be left at each side of the hedges for cultivation.

A new vineyard, of about one acre, was set out in the autumn as it will shortly be necessary to remove the old vineyard so that the land may be used for other purposes. A piece of land, of about seven acres, hitherto in the Agriculturist's Division, was transferred to the Horticultural Division in the autumn of 1911 and will be used for experiments with vegetables.

The office work has greatly increased during the past year. The number of letters received and despatched has about doubled. The work in preparing the accounts is considerable, and the work in keeping a record of the experiments in progress and the stock on hand and needed on the branch Farms has been heavy.

Branch Farms.—In my capacity as Dominion Horticulturist wherein I am to visit the Branch Experimental Farms and Stations and discuss with the Superintendents the experiments being conducted with fruits, garden vegetables, forest and ornamental trees, shrubs, and herbaceous plants and to assist them in any other way in my power, I have, I think, been able during the past year to render some service. I also beg to state that the change in my duties and the broadening of them has made a great difference in the kind of work done by me. Owing to my long absences from home in visiting the branch Farms it has been necessary to

delegate to my assistants most of the details in connection with the experimental work at the Central Experimental Farm with which I was intimately connected for twenty-three years, and when I am home I find that the administrative work of the Division, covering now as it does the Central Farm and Branch Farms, Stations and Sub-stations to the number of twenty-five, occupies a large part of my time and it is scarcely necessary to state this new work means a greatly increased responsibility.

During the year, I visited the Experimental Farms at Brandon, Indian Head, Rosthern, Scott, Lacombe, and Lethbridge, once each; the Station at Cap Rouge, four times; Nappan, twice; Charlottetown, twice; and Kentville, three times. At the Experimental Station at Scott I planned the horticultural grounds with the Superintendent and assisted in planting the first apple trees, plum trees, small fruits and ornamental trees and shrubs there. Hitherto the prairie about Scott had been treeless. At Rosthern and Lacombe I also assisted in planning and planting additional areas at these comparatively new Stations. At Brandon, Indian Head and Lethbridge I conferred with the Superintendents in regard to the work in horticulture and made any suggestions which seemed necessary. At Cap Rouge, Que., a new Station, I planned with the Superintendent the laying out of the orchards, small fruit and vegetable plantations and ordered the material for these, and my Assistant, Mr. T. G. Bunting, superintended the planting of the trees. Mr. F. E. Buck, my other Assistant, has prepared a plan for the ornamental grounds there, and it is hoped they will be planted this year. At Kentville, N.S., I suggested the area to be devoted to horticulture, and, as no Superintendent had been appointed, I ordered at the proper time for the area to be planted in 1912, the necessary trees. I also had seed of some of the best varieties of winter apples sown there, looking to the growing of an orchard of seedling trees. At Charlottetown, P.E.I., and Nappan, N.S., I conferred with the Superintendents in regard to the work and made what suggestions seemed desirable.

As the past year was practically the beginning of my work as Dominion Horticulturist, and as I found there were many things which it seemed desirable to change or improve in connection with experimental work in horticulture at the branch Farms, I beg to submit a statement of some of the more important changes made and the suggestions given.

1. Planned and installed at the Central Experimental Farm a system of card indexes specially adapted for keeping a record of the varieties of fruits, vegetables, flowers, ornamental trees and shrubs, and herbaceous plants being tested at the various branch Experimental Farms and Stations, in order that we might readily know what was being grown and what was needed. In order to simplify the work of keeping the records, each Experimental Farm and Station is designated by a numeral.

2. Devised special field and permanent record books for use at the branch farms and stations for keeping records of the behaviour of the varieties of fruits, vegetables, flowers, ornamental trees and shrubs, and herbaceous plants, and for recording results of experiments; also suggested methods of keeping records in same.

3. Instituted a system of allotting to each variety, or individual plant, an identification or record number by which the history of that variety or plant can be readily traced.

4. In experiments with varieties of vegetables it was suggested that they be grown on the same sized plots, with the plants the same distance apart, at each of the Farms, for the purpose of comparing results, one Farm with another. The size of the plots and distances apart of rows were adopted after referring to the Superintendents.

5. Weekly report blanks to be used at each Farm for recording information likely to prove valuable for reference at each Farm, and for reporting weekly to the Central Farm, were supplied to the Superintendents and are being used by them.

6. The filing of correspondence at the Central Farm has been better systematized so that the letters in connection with the branch Farms, and in fact with all correspondents, may be referred to promptly and the letter desired found.

7. Uniform abbreviations were suggested in recording notes, as in the past these had varied considerably and were sometimes puzzling.

8. Uniform wooden stakes for labelling small fruits, so that the names can be readily seen, have been suggested for the branch Farms.

9. A system of labelling which will enable the Superintendents to readily keep a record of the ornamental trees, shrubs, and herbaceous plants, has been adopted.

10. Selection of labels considered the best for permanency, legibility, neatness and cheapness, with suggestions and notes on labelling and style of lettering, furnishing examples.

11. Furnishing the branch Farms with seedling apple trees for test, with the object of obtaining desirable hardy sorts, and offering suggestions as to planting and care of the seedlings sent.

12. Distribution from the Central Farm of different varieties of specially selected strains of vegetables.

Furnishing the branch Farms with seed of specially selected strains of vegetables developed at the Central Farm for growing for distribution.

In addition to the changes made in the horticultural work and the suggestions given, we have continued to order for and supply the branch Farms with most of the fruit trees and bushes and ornamental trees, shrubs and herbaceous plants which it was desired to have tested at these Farms. The flower and vegetable seeds and labels have also, as in the past, been supplied mainly through the Central Farm.

MEETINGS ATTENDED AND ADDRESSES GIVEN.

A number of meetings were attended during the year and addresses given at most of them. At the summer meeting of the Quebec Pomological Society, held at Inverness, Que., on August 29-30, 1911, an address was given on 'Planting an Orchard.' At the annual meeting of the New Brunswick Fruit Growers' Association, at St. John, N.B., on November 1, I gave an address on 'Characteristics of Varieties of Apples Grown in New Brunswick.' For the annual meeting of the Ontario Fruit Growers' Association, at Toronto, November 15-16, 1911, I prepared and read the report on 'New Fruits,' and also gave an address on 'Fruit Growing in Nova Scotia.' For the annual meeting of the Ontario Horticultural Society, at Toronto, November 16-17, 1911, I prepared and read the Report on Novelties, and also read a paper on 'The Best Spiraeas.' At the annual meeting of the Ontario Vegetable Growers' Association, at Toronto, November 15, 1911, I gave an address on 'What the Central Experimental Farm is doing for Vegetable Growers.' I read a paper on 'New and Little Known Fruits,' at the annual meeting of the Quebec Pomological Society, Macdonald College, Que., December 5-6, 1911. At the annual meeting of the American Breeders' Association, held at Washington, D.C., U.S., December 28, 1911, I read a paper on 'Apple Breeding in Canada,' and on December 29, 1911, in the same city, read a paper on 'Characteristics of McIntosh Apple Seedlings,' before the Society for Horticultural Science at its annual meeting. At this meeting I was elected president of the Society for Horticultural Science for 1912. I attended the meeting of the Nova Scotia Fruit Growers' Association at Wolfville, N.S., on January 8-9, 1912, and gave an address on 'Work of an Experimental Fruit Station with Especial Reference to the Experimental Station at Kentville, N.S.,' and 'Is Apple Growing being Overdone.' At the Short Course in Horticulture at Macdonald College, Que., I addressed the students on 'Orchard Problems' on January 29, 1912, and on February 14, I read a paper before the Dominion Fruit Conference, Ottawa, on 'New Fruits.'

My assistant, Mr. T. G. Bunting, attended the field meeting of the South Renfrew Farmers' Institute at Burnstown, Ont., on June 14, 1911, where he gave a talk on 'Apple Growing.' He also attended the annual meeting of the Quebec Vegetable Growers' Association, at Cartierville, Que., on January 17, 1912, where he gave a paper on 'Better Methods in Vegetable Growing.'

DONATIONS DURING THE CALENDAR YEAR 1911.

SENDER.	DONATION.
Adney, Tappan, Upper Woodstock, N.B.	Apple scions, Pear scions, Seed of improved tomato.
Adams, E. E., Leamington, Ont.	Seed Selected Earliana tomato.
Burpee, W. Atlee, Philadelphia, Pa., U.S.	Seeds of leading specialties.
Bramball, G. H., Lloydminster, Sask.	Seed Walkley Champion Celery.
Cooke, Walter J., Cataraqui, Ont.	Seed of Early Corn .
Crow, Prof. J. W., O.A.C., Guelph, Ont.	Seed O.A.C. Strain Clipper, Industry, Sparks Earliana and Wealthy tomatoes.
Colpitts, Walter, Point de Bute, N.B.	New Potato.
Cross, D. J., Maidstone, Sask.	Sample of Pea seed.
Criddle, Norman, Treesbank, Man.	Seeds Lithospermum canescens.
Devlin, R. B., 36 Bonanza, Dawson.	Potato.
Faull, Prof., Toronto University, Toronto, Ont.	Seeds Lindera megaphylla
Heikel, B. W., Hameenlinna, Tavastehus, Finland.	Plum scoins, 6 varieties, 1 variety Plum scions, 1 variety Crab Apple scions.
Hansen, Prof., S. D., Brookings, S.D., U.S.	Plum scions, 8 varieties.
Hilborn, J. L., Leamington, Ont.	Seed of Tomato.
Hutchison, A. F., Swan River, Man.	Potato, May Flower.
Jack, N. E., Chateauguay Basin, Que.	Scions Grimes Golden apple.
Johnson's Nurseries, Campbellford, Ont.	Scions Johnson's Seedling apple.
Judge, Wm., Orangeville, Ont.	Apple scions, Plum scions.
Jenewin, Jos., Samen-Handlung, Innsbruck, Austro-Hungary.	Seed Tyrolese Larch.
Kelver, N. D., Spring Bourne, Man.	Potato.
Kilpatrick, J., Ottawa, Ont.	Plum scions.
Keyes, P. G., Ottawa, Ont.	Scions Seek-no-Further apple.
Lawrence, S. A., Upper Stewiacke, N.B.	Seeds Melons, water and musk.
Leech, Daniel, Salmon Arm, B.C.	Scions Yellow Newtown Pippin apple.
Pay, A., St. Catharines, Ont.	Pear scions.
Phipps, R. C., Collbran, Col., U.S.	Seed corn and citron.
Rich, N., Mannville, Alta.	Potato, Earliest of All.
Robertson, Geo., St. Catharines, Ont.	Seed Selected Sparks Earliana tomato.
Solaway, Ben P., Halcyonia, Sask.	Potatoes, 9 varieties.
Sherrington, A. E., Walkerton, Ont.	Improved Express tomato, Scions Snitzler plum.
St. George's Nursery Co., Harlington, Middlesex, England.	Seed Cyclamen, Calceolaria, Primula.
Teilbein, T., Millet, Alta.	Gooseberries: Red, Skunk; Native Spruce.
Trew Bros., Fortier, Man.	Unknown potato.
Tait, David, Iron Bridge, Ont.	Scions Muskoka Beauty apple.
Taylor, W. R., Aylmer, Que.	Scions Peter apple.
Walker, J. P., Wyers Brook, N.B.	Seed potatoes.
Williams, Thos., Duck Lake, Sask.	Peas, very early variety.

ACKNOWLEDGMENTS.

It is with much pleasure that I again take this annual opportunity of acknowledging the help received during the past year, not only from those directly connected with the Horticultural Division at Ottawa, but from that larger number of men interested in horticulture and its development throughout Canada, Great Britain, the United States and other countries. From many sources and individuals I have received help and encouragement which have been of great assistance in enabling me to carry out my work and plans for the progress of Horticulture in Canada. I wish especially to thank the Superintendents of the Branch Farms and Stations for their kind co-operation and readiness to carry out the suggestions

which I have made in regard to the horticultural work on the farms under their charge. Without this spirit of co-operation the help I should be able to render would be much lessened.

At Ottawa I am fortunate in having associated with me men who are interested in their work, for without this interest the quality of the work would be likely to suffer. My Assistants, Mr. T. G. Bunting and Mr. F. E. Buck, have been able to relieve me of a large part of the detail work connected with experiments, the former in regard to fruits and vegetables, and the latter in regard to ornamental plants. Mr. Bunting has also acted in my place when I have been absent from home and has shown good judgment. The Secretary of the Horticultural Division, Mr. J. F. Watson, has had a great increase in responsibility during the past year on account of the work connected with the branch Farms, in connection with the accounts and in regard to the correspondence, which has about doubled. He has not only done his work thoroughly, but has greatly improved the system of keeping the correspondence. Mr. H. Holz, Foreman, has continued to render good service. Much of the success of the outside work depends on him. Mr. W. T. Ellis has continued in charge of the greenhouse and has done his work with his accustomed thoroughness. Mr. Horace Read, Assistant Foreman, continued to aid in the experimental work from spring until winter, but during the past winter has done good work in transferring the records of the branch Farms to the Central Card System here. To the other men on whom, though in less responsible positions, it is necessary to rely for most of the manual work outside, I wish to express my appreciation of the work done by them.

I have the honour to be, sir,
Your obedient servant,

W. T. MACOUN,
Dominion Horticulturist.

CHARACTER OF SEASON.

On the 12th of April, 1911, the frost was out of the ground and the soil dry enough to dig in some parts of the nursery at the Central Experimental Farm. During the past thirteen years a record of this kind has been kept and the average possible date for digging for that period is April 11.

The month of April was cool, on the whole. The highest temperature was 81·2° F. on the 29th, and the lowest 3·6° F. on the 4th. The rainfall was light. May was a warm month. There were four extremely hot days for May when the temperature rose above 90° F. The two hottest days were the 21st and 22nd, when the thermometer registered 93·8° F. and 93·9° F., respectively. On thirteen days the temperature was over 80° F. There was comparatively little rain during the month. Owing to extremely hot, dry weather the blooming period for fruits was shortened very much, the apple trees only being in bloom for from three to four days. The blooming of bulbs was unsatisfactory owing to the hot weather, and the lilac season was much shortened. Seed of American elm was ripe on the 26th, and Silver Maple on the 30th. Vegetation was much further advanced than usual at the end of the month. The last spring frost was recorded on May 4, when the temperature was 24° F. June was a moderately warm month. The highest temperature was on the 27th, when it was 88° F., and the lowest was 46·8° F. on the 4th. During the month the growth of most things was very rapid as there was sufficient moisture, but plants requiring high temperature did not make much growth, as the nights were cool.

July was an extraordinarily hot month, one of the hottest ever experienced in Ottawa. The temperature was over 90° F. on eight days and over 80° F. on twenty days. The highest temperature was 97·8° F. on the 3rd. The mean temperature for the month was 71·46° F. Many nights were very warm. The rainfall was light in July. August was another very hot month. The temperature was over 90° F. six times, and 80° F. for over twenty times. The hottest day was the 1st, when the record was 97·6° F. The mean temperature for the month was 70·31° F. The rainfall was light in August and the ground remained very dry throughout the month. Potato foliage became much dried up owing to tip burn, rhizoctonia disease, and general lack of vigour. Apples dropped badly and ripened too fast. Sweet peas would not bloom, and leaf hoppers and red spider were very abundant. September was a moderately warm month. The highest temperature was 80·8° F. on the 1st, and the lowest 28·8° F. on the 14th. This frost killed tender plants, such as potatoes, melons tomatoes, tender annuals, etc. Geraniums were badly injured on some parts of the grounds, the stems being frozen to near the ground, while on other parts the stems were not hurt. The flowers of *Hydrangea paniculata grandiflora* which were in fine condition before the frost were badly injured. The ground which had become too dry early in July did not receive sufficient moisture until after the middle of September. October was a fine, moderately warm month. The highest temperature was 72·0° F. on the 4th, and the lowest 23·6° F. on the 28th. There had been no frosts to injure hardy annuals from September 14 until this date and they had been blooming well during that time. The first heavy fall of leaves of ornamental trees occurred on October 17. The weather during most of November was mild. The highest temperature was 60° F. on the 12th, and the lowest 5·8° F. on the 17th. The first two weeks of the month were mild, with little or no frost in the ground, but on the 14th there was a snow storm of a few inches, sufficient to make fair sleighing, and winter may be said to have set in on November 15, with but little frost in the ground. The average date that winter has set in for the past fourteen years is November 24. By December 2, there was about a foot of snow on the ground but little frost in it, but by the 11th the snow and frost had both gone. On the 14th, the strawberries were covered with straw the snow having come so early in November that they had not been covered before. On the 15th, about six inches of snow fell on unfrozen ground, making sleighing again. The highest temperature in December was 51·6° F. on the 11th, and the lowest 3·6° F. below zero on the 20th. It was only twice below zero during the month, which was a very mild one. The month of January was a great contrast to December, and cold weather set in on the 3rd. The temperature only rose above freezing on one day during the month, namely, on the 19th, when it was 36·4° F. The lowest temperature of the month and the lowest of the winter was 26·2° F. below zero on the 13th. During the month the temperature was below zero on seventeen days, and below 20° F. below zero on four days. By the end of the month there were about fifteen inches of snow on the ground, but there had been less in the early part of the month and the frost went down very deep. February was also a very cold month, and while the temperature rose slightly above freezing on five days there was little thawing. The lowest temperature was 24·0° F. below zero on the 10th. The temperature during the month was twice below 20·0° F. below zero, and 12 times below zero. There were several snowstorms during the month and by the end of it there was about two feet of snow on the ground. The first half of March was cold for that month. For the first six days the temperature went several degrees below zero every day, on the 6th it was 17·0° F. below zero, the coldest day of the month. It was below zero seven times in March. The snow went very little until the 27th, when it began to go rapidly and by March 31 there was about one foot in most places, but ground showing in spots.

While the past winter was a very cold one it was not nearly so severe as the winter of 1903-4, when December, January, and February were all very cold months and the temperature went below zero on 58 different times, compared with 38 during the past one.

FRUIT AND VEGETABLE CROPS.

The only part of Canada where there was a heavy crop of apples in 1911 was in the Annapolis Valley and adjacent valleys of Nova Scotia, where a crop much above the average was harvested. The fruit was better matured and higher coloured than usual and practically free of apple scab. Some varieties were undersized owing to the drought. There was a good crop of apples in Prince Edward Island, especially of the earlier varieties. The crop of early apples in New Brunswick was also good; the main crop of apples, however, was below the average. Early apples were a medium to good crop in Quebec and Eastern Ontario. The crop of Fameuse was however, light. McIntosh gave a medium crop. In other parts of Ontario the crop ranged from light to good, there being considerable difference in varieties, larger crops being usually among the earliest sorts. The crop, on the whole, was below medium, but was practically free of scab. In British Columbia the apple crop was light on Vancouver Island and the lower mainland, but medium in the Okanagan and other inland valleys. Pears, plums, and peaches were a medium crop in Ontario. Pears were a light crop on Vancouver Island and the lower mainland of British Columbia, but medium to good in the inland valleys. Grapes were a good crop in Ontario. The small fruit crop in the provinces of Ontario and Quebec was light in 1911 owing to the severe drought and hot weather. In the Maritime provinces the crop was better, but was light in some parts.

The potato crop was a very poor one in the provinces of Ontario and Quebec on account of the extremely hot weather and protracted drought. In the Maritime provinces the crop was a medium one, and a good one in the Prairie provinces and parts of British Columbia.

The tomato crop was reduced very much in the province of Ontario owing to the extreme drought. Other vegetables were not up to the average for the same reason.

At the Central Experimental Farm there was a medium crop of apples, and of Americana and Nigra plums, but no European plums. There were no cherries in 1911. The crops of currants, gooseberries, and raspberries were only medium, and the strawberry crop was light, mainly owing to spring frosts injuring the flowers.

There was only a medium crop of grapes, but the fruit ripened well owing to the long, warm autumn without severe frosts. The potato crop was very poor owing mainly to the drought and to the rhizoctonia disease. The tomato crop was also light. Peas were a poor crop, and most other vegetables suffered considerably owing to the long-continued hot, dry weather.

SEEDLING FRUITS RECEIVED FOR EXAMINATION, 1911-1912.

The number of good fruits originating in Canada is increasing every year. Some of the best commercial varieties are of Canadian origin and we believe that within the next twenty-five years a much larger proportion of the fruits offered for sale by Canadian nurserymen will be from that source. During the past twenty-four years many very promising new fruits have been sent to the Horticultural Division for examination. Where possible, scions or plants of these have been

obtained and tested. During the past year a number of seedling fruits have been received, of which a record is given below. Full descriptions follow of those considered most promising.

Record Number.

545 Seedling apple, from J. W. Johnston, Campbellford, Ont. (see full description).
546 Seedling apple, "Aurora," from T. W. Gibbs, Aurora, Ont., (see full description).
547 Sport (?) of St. Lawrence apple, "Billings", from Miss Bertha Billings, Brockville, Ont., (See full description).
548 Seedling apple from W. H. Smith, Port Dover, Ont., (see full description).
549 Seedling apple from W. H. Smith, Port Dover, Ont.
550 Seedling apple from W. H. Smith, Port Dover, Ont.
551 Seedling apple No. 1., from C. L. Stephens, Orillia, Ont.
552 Seedling apple from Alex. McNeill, Ottawa, Ont.
553 Seedling apple from Wm. Moore, Milton, Ont. (received in 1910).
554 Seedling of Whitney crab, from H. G. G. Schmidt, Madawaska, Ont.
555 Seedling apple, from H. G. G. Schmidt, Madawaska, Ont.
556 Seedling apple, from H. G. G. Schmidt, Madawaska, Ont.
557 Seedling apple, from Peter Collyer, South Bay, Ont., (see full description).
558 Seedling of Duchess apple, from Geo. Malcolm, Shanty Bay, Ont., (see full description).
559 Seedling of Wealthy apple, from Geo. Malcolm, Shanty Bay, Ont.
560 Seedling apple, from Geo. Bowman, Spring Valley, Ont.
561 Seedling apple, from Millen Gibson, West Dalhousie, N.S.
562 Seedling apple, "Shaffner," from, A. S. Hunt, Lawrencetown, N.S. (see full description).
563 Seedling apple "Leonard," from New Brunswick, per T. W. Bowman & Sons, Ridgeville, Ont., (see full description).
564 Seedling apple "Keen's Red," from Alfred Keen, St. Mary's Ferry, York Co., N.B., (see full description).
565 Seedling apple, from J. B. Williston, Baie du Vin, N.B.
566 Seedling crab apple, from A. G. Turney, Fredericton, N.B.
567 Seedling of Alexander apple, from G. S. Gilbert, Burton, N.B.
568 Seedling of Fameuse apple, from G. S. Gilbert, Burton, N.B., (see full description).
569 Seedling apple, from Mrs. Samuel Robinson, Grand Bay, N.B.
570 "Summer Harvey" apple, from Tappan Adney, Upper Woodstock, N.B., (see full description).
571 "Sharp's Sweet crab apple," from Tappan Adney, Upper Woodstock, N.B.
572 "Mark No. 10" apple, from Tappan Adney, Upper Woodstock, N.B.
573 "Mark No. 51" apple, from Tappan Adney, Upper Woodstock, N.B.
574 "Mark No. 53" apple, from Tappan Adney, Upper Woodstock, N.B.
575 "Mark No. 55" apple, from Tappan Adney, Upper Woodstock, N.B.
576 "Mark No. 93" apple, from Tappan Adney, Upper Woodstock, N.B.
577 Seedling apple, from R. J. Wiggins, Elmside, Que.
578 Seedling apple, from Louis Gervais, Lawrenceville, Que.
579 Seedling apple, from Jas. T. MacMillan, Penticton, B.C.
580 Seedling peach, from D. Robertson, Oakville, Ont.
581 Seedling plum, "Warren No. 1," from W. Courtneidge, Starbuck, Man., (see full description).
582 Seedling plum, "Warren No. 2," from W. Courtneidge, Starbuck, Man.

545. Seedling apple from J. W. Johnston, Campbellford, Ont.—Above medium size; roundish, ribbed; cavity deep, open; stem very short, stout; basin deep, medium width, wrinkled; calyx closed; colour yellow well washed and splashed with crimson, approaching orange-red; predominant colour crimson; seeds below medium, plump, acute; dots few, white distinct; skin moderately thick, tender; flesh dull white, crisp, moderately juicy; core medium size; subacid, pleasant flavour; quality good; season November, probably to January.

An attractive looking apple.—About same season as McIntosh, evidently. On this account would not be as useful as it otherwise might be. Not juicy enough for best dessert purposes. Should, however, ship better than McIntosh.

546. Seedling apple from T. W. Gibbs, Aurora, Ont.—Above medium size to large; roundish conical, slightly oblate; cavity deep, moderate width, regular, green; stem rather short, moderately slender; basin deep, wide, large, regular, slightly wrinkled; calyx partly open; colour greenish yellow, washed with light red, splashed heavily with crimson; predominant colour crimson; seeds rather large, acute; dots few, small, whitish; skin moderately thick, brittle; flesh yellow-white, slightly tinged with red, moderately juicy, moderately tender; core medium, flavour moderately mild, subacid; quality above medium to almost good; season mid August to mid September.

A very attractive apple, somewhat resembling the Duchess in outward appearance, but not quite so acid in flavour.

547. Billings (Red) Apple.—Above medium; oblate; cavity open, deep; stem short to medium, moderately stout; basin deep, open, wrinkled; calyx closed; colour yellow almost entirely covered with deep crimson; predominant colour deep crimson; seeds medium size, acute; dots moderately numerous, white and bluish, distinct; skin thick, moderately tender; flesh white with traces of red to core line, tender, juicy; core, medium; subacid, pleasant flavour; quality good to very good; season late September, probably to mid-October.

A handsome apple, much like St. Lawrence in flesh and flavour, but more highly coloured.

548. Seedling apple from W. H. Smith, Port Dover, Ont.—Large; roundish conical, ribbed; cavity deep, open; stem short, stout; basin deep, medium width, wrinkled; calyx open; greenish-yellow, well splashed and washed with crimson; predominant colour crimson; seeds medium size, dark, acute; dots few, yellow; skin thick, tough; flesh yellowish with traces of red, tender, moderately juicy; core medium size; subacid, pleasant, quite pear-like flavour; quality good; season evidently early to midwinter.

Resembles Northern Spy very much in outward appearance, but not as good in quality as Spy, hence not specially promising unless hardier and an earlier bearer.

557. Seedling apple, possibly of Gravenstein, from Peter Collyer, South Bay, Ont.—Medium size; oblate, sightly conical, angular; cavity moderate depth and width, russeted; stem medium length, slender; basin moderate depth and width, wrinkled; calyx almost closed; deep yellowish, washed with orange red, splashed with crimson; predominant colour yellowish; seeds medium to small, obtuse; dots rather obscure, few; skin thick, tough; flesh yellowish, moderately juicy, tender; core rather small, mildly subacid, pleasant flavour; quality good; season September to October.

Resembles Gravenstein in outward appearance considerably. Quality good.

558. Duchess Seedling apple from Geo. Malcolm, Shanty Bay, Ont.—Medium to above in size; oblate, slightly conical; cavity rather deep and wide; stem moderate length, moderate thickness; basin rather deep, moderate width; calyx closed; colour pale yellowish-green, washed with bright red, splashed with crimson; predominant colour crimson; seeds medium, plump, acute; dots few, large, distinct, yellowish; skin thin, tender; flesh white, juicy, tender; core small; mildly subacid flavour; quality above medium; season late August to mid-September.

Resembles Duchess considerably in outward appearance and in season, but is much tenderer in flesh and milder in flavour.

562. Shaffner Apple.—Very large; roundish, ribbed; cavity deep, open; basin deep, open, wrinkled; calyx open; colour yellow, well splashed and washed with attractive orange red; predominant colour orange red; seeds above medium, obtuse; dots few, grey, distinct; skin moderately thick, tender; flesh yellowish with traces of red next basin, coarse, crisp, juicy; core medium size, open; subacid, not much flavour; quality above medium to good; season evidently early to mid-winter.

A good seedling, about 8 years old. Grew in a fence row. A large, handsome apple. Probably a seedling of Tompkins King, from appearance.

563. Leonard Apple, from New Brunswick, per Thos. Bowman & Son, Ridgeville, Ont.—Very large; roundish, conical; cavity deep, moderate width, regular; basin moderate depth and width; calyx open; colour yellowish-green, almost entirely washed with attractive crimson, splashed with dark crimson; predominant colour attractive crimson; seeds large, long, obtuse; dots few, very large, distinct, greyish; skin thick, moderately tough; flesh creamy-white, moderately juicy, rather coarse; core above

medium; mildly subacid flavour; quality about medium to above medium; season late September to probably November.

A very large, attractive apple slightly resembling the Baxter, also the King, but earlier than King. Flavour and quality are not good, but otherwise a desirable apple.

564. Seedling apple from Alfred Keen, St. Mary's Ferry, York Co., N.B.—Medium size; roundish conical; cavity medium depth and width; stem moderate length, moderately stout; basin deep, medium width, wrinkled; calyx closed; colour greenish-yellow well washed with deep crimson; predominant colour deep crimson; seeds large, acute; dots moderately numerous, yellow, indistinct; skin moderately thick, tender; flesh white, tinged with red, tender, juicy; core medium size; subacid, pleasant, slightly astringent flavour; quality good; season evidently September to early October.

Growing in a field without cultivation. A highly coloured apple of the Fameuse type. Originator desires to call it Keen's Red.

568. Fameuse seedling from G. S. Gilbert, Burton, N.B.—Above medium to large in size; oblate; cavity medium depth and width; stem medium length, stout; basin deep, medium width, wrinkled; calyx partly open; colour pale yellow well washed with attractive crimson; predominant colour crimson; seeds medium size, acuminate; dots few, white, indistinct; bloom pinkish; skin moderately thick, moderately tough; flesh very white, crisp, tender, juicy; core below medium; subacid, pleasant, spicey, pear-like flavour; quality good; season evidently late October to January. Resembles Fameuse in whiteness of flesh.

Said to be a seedling of Fameuse. A handsome apple, but not as good as either McIntosh or Fameuse. Should be useful if a better keeper or hardier than McIntosh or Fameuse.

570. Summer Harvey apple.—Medium size; oblate to roundish; cavity open, shallow; stem short to medium, stout; basin medium width, shallow, wrinkled; calyx closed; colour yellow, sometimes with a slight brownish blush on sunny side, green about cavity; predominant colour yellow; seeds medium size; dots obscure; skin moderately thick, tender; flesh yellowish, tender, juicy; core medium; subacid, pleasant flavour; quality above medium; season early August, perhaps late July.

Native of New Brunswick.

Season as early or earlier than Astrachan, earlier than Yellow Transparent, but not so early as Crimson Beauty.

581. Plum Seedling No. 1. Called Warren Seedling No. 1. From W. Courtneidge, Starbuck, P.O., Man.—Oval; medium size, $1\frac{1}{8}$ x $\frac{7}{8}$-inch; cavity medium size, medium depth; suture distinct, slightly depressed; apex slightly depressed with a small point off to one side; colour yellow, two-thirds overspread scarlet-crimson; dots moderately numerous, medium size, whitish with crimson rim; skin thin, tough; flesh yellowish-orange, medium firm, juicy; stone oval, almost free; flavour sweet, rich, pleasant, buttery; quality good;

A plum with a very good appearance and of good quality. Lacks in size. Should be of value for the west. Nigra (?) group.

APPLES ORIGINATED IN THE HORTICULTURAL DIVISION, CENTRAL EXPERIMENTAL FARM.

During the past eight years 997, or practically 1,000, new varieties of apples have fruited at the Central Experimental Farm, Ottawa, Canada. These all originated at this Farm and are natural seedlings of Fameuse, McIntosh, Shiawassee, Langford Beauty, Northern Spy, St. Lawrence, Winter St. Lawrence, Lawver, Gano, Bullock (American Golden Russet), Swayzie, Wealthy, Salome, Scott (Winter), and others. These grew in a test orchard and were surrounded by many other varieties. Seed was saved from number one fruit in 1898 and later, and sown, and the seedlings after passing through the seed bed and nursery row stage were eventually

planted in the orchard 15 feet apart each way. The results have been surprising. More than three-fourths of the 1,000 varieties which have already fruited have been of marketable size and the proportion of really promising apples has been quite large. Of these 67 have been named.

Descriptions, in detail, have been made of the great majority of the seedlings which have fruited, whether the quality was good or poor, or whether the fruit was large or small.

This large number of descriptions has enabled us to ascertain what proportion of the seedlings of each mother parent resemble that parent in any or all of the marked characteristics of apples such as size, form, colour, flesh, flavour, season, etc., and also in what way, if any, the male parents, of which there must have been a considerable number of varieties, have impressed themselves on the seedlings. How many of the seedlings are from self-pollenized flowers we do not know. It may be stated in passing that in addition to this lot of seedlings we have several hundred trees from hand-crossed flowers of which both parents are known. Most of these, however, are younger trees than the natural crosses referred to above.

In the Report of the Dominion Experimental Farms for 1911, was published in tabular form the main characteristics of 581 of these seedlings and the percentage of the seedlings which have certain characters. The marked characteristics of the seedlings from each female parent were summarized in paragraph form. One of the striking things is that apples of good quality or flavour give a large proportion of seedlings of good quality with the exceptions of Fameuse and American Golden Russet, which have been very disappointing in this respect. The absence of flavour in Gano has impressed itself on the seedlings and few of them are more than medium in quality. The good quality and high flavour in the seedlings of Northern Spy and McIntosh are particularly remarkable in that both of them are self-sterile, at least, we believe, at Ottawa, and they must have been pollenized by other varieties though so far the influence of the male parents has not been sufficiently evident for us to decide on what they were.

There were 656 varieties of these seedlings fruited in 1911 of which 276 varieties fruited for the first time.

Following are descriptions of 19 named seedlings not hitherto described in the Experimental Farm reports.

Albert (Winter St. Lawrence Seedling).—Fruit medium size; roundish, regular; cavity medium depth and width; stem short, stout; basin deep, medium width, wrinkled; calyx open; colour yellow, well washed and splashed with deep red; predominant colour, deep red; seeds medium size, acuminate; dots moderately numerous, white, distinct; bloom pinkish; skin moderately thick, tough; flesh white, firm, crisp, tender, moderately juicy; core medium size; subacid, pleasant flavour; quality good; season late November, probably to February or later.

Resembles Winter St. Lawrence considerably in colour, flesh and flavour. Promising.

Atlas (Winter St. Lawrence Seedling).—Large; roundish; cavity deep, medium width; stem short to medium, moderately stout; basin narrow, deep, wrinkled; calyx partly open; colour pale yellow almost white, splashed and washed with carmine; predominant colour carmine; seeds medium size, acuminate; dots obscure; skin moderately thick, tender; flesh white with traces of red, tender, moderately juicy; core medium; subacid, pleasant flavour; quality good; season late October, probably to December.

Considerably like Winter St. Lawrence in outward appearance, flesh and flavour. More attractive than Winter St. Lawrence and about same season.

Caruso (McIntosh Seedling).—Large; roundish, conical, ribbed; cavity deep, open; stem short to medium, stout; basin narrow, medium depth, wrinkled; calyx

closed or partly open; colour pale yellow, well washed with attractive crimson; predominant colour crimson; seeds medium, obtuse; dots obscure; bloom pinkish; skin moderately thick, tender; flesh yellowish, crisp, tender, juicy; core medium size, open; subacid, pleasant flavour; quality good; season early September to November.

A handsome apple resembling McIntosh in colour and a little in flesh and flavour.

Cleaver (Salome Seedling).—Above medium size; oblong, conical, regular; cavity medium depth and width; stem medium length, slender; basin medium depth and width, wrinkled; calyx partly open; colour yellow, well washed and splashed with crimson, approaching orange red; predominant colour attractive crimson; seeds medium size, acute; dots few, yellow, distinct; skin moderately thick, tender; flesh yellowish, tender, buttery, moderately juicy; core large, open; subacid, pleasant flavour; quality good; season December to late winter.

Resembles Salome considerably in outward appearance, flesh and flavour. An attractive-looking apple.

Donald (Northern Spy Seedling).—Large; oblate, slightly ribbed; cavity deep, medium width, russeted; stem short, moderately stout; basin deep, medium width, wrinkled; calyx closed or partly open; colour yellow splashed and washed with crimson; predominant colour crimson; seeds medium size, acute; dots few, yellow, distinct; bloom pinkish; skin moderately thick, tender; flesh yellowish, crisp, tender, rather coarse, juicy; core medium; subacid, pleasant, sprightly, not high flavour; quality good; season late October, probably to mid-winter or late winter.

A handsome apple which yielded well this year. Resembles Northern Spy somewhat in colour and character of flesh.

Elmer (Northern Spy Seedling).—Medium to above in size; roundish; cavity deep, narrow, russeted at base; stem slender; basin deep, medium width, slightly wrinkled; calyx open; colour greenish yellow, well washed and splashed with deep crimson; predominant colour deep crimson; seeds medium size, acute; dots obscure; bloom pinkish; skin moderately thick, tough; flesh yellowish, crisp, tender, juicy; core medium size; subacid, pleasant, sprightly flavour; quality good; season January to late winter.

Looks and tastes considerably like Northern Spy. Flesh much like Northern Spy. Promising.

Garnet (McIntosh Seedling).—Above medium size; oblate, flattened at ends, prominently angular; cavity deep, open; stem short, stout; basin open, deep, slightly wrinkled; calyx closed or partly open; greenish yellow, washed with dull crimson; predominant colour dull crimson; seeds abortive 1910, also in 1911; dots obscure; bloom thin, pinkish; skin moderately thick, moderately tough; flesh dull white, tender, moderately juicy; core small, subacid, pleasant flavour; quality above medium to good; season December to late winter.

Gerald (Langford Beauty Seedling).—Medium to above in size; roundish; cavity medium depth and width; stem medium length, moderately stout; basin deep, medium width, wrinkled; calyx partly open; colour greenish yellow, washed with crimson; predominant colour crimson; seeds above medium size, acuminate; dots few, yellow, distinct; skin moderately thick, moderately tender; flesh white, tender, juicy; core medium; subacid, pleasant flavour; quality good; season late November probably to February or later.

An attractive-looking apple of good quality. Resembles Langford considerably in outward appearance, flesh and flavour.

Holz (Lawver X McIntosh).—Medium size; roundish; cavity open, medium depth, russeted; stem medium length, stout; basin deep, open, slightly wrinkled; calyx open; colour pale greenish-yellow, well washed with crimson; predominant

colour crimson; seeds large, acuminate; dots few, white, distinct; skin moderately thick, tender; flesh dull white, firm, crisp, juicy; core small, subacid, pleasant but not high flavour; quality above medium to good; season January to late winter.

Resembles Lawver very much in outward appearance, flesh, keeping qualities and in flavour. No marked resemblance to McIntosh.

Horace (Langford Beauty Seedling).—Above medium to medium in size; roundish conical, regular; cavity medium depth and width; stem medium length, slender to moderately stout; basin deep, medium width, slightly wrinkled; calyx closed; colour pale yellow covered with rich crimson; predominant colour rich crimson; seeds medium size, acute; dots few, pale yellow, distinct; bloom very bluish; skin moderately thick, tough; flesh white, tender, juicy; core medium; briskly subacid, pleasant flavour; quality good; season early September to November.

Much like Langford Beauty in colour, shape, flesh, and flavour. May be a little later in season.

Joyce (McIntosh Seedling).—Medium size; oblate to roundish, ribbed; cavity medium depth and width; stem short, moderately stout; basin medium depth and width, wrinkled; calyx closed; colour yellow, washed and splashed with crimson; predominant colour crimson; seeds medium size, acute, dots few, yellow, distinct; skin moderately thick, tender; flesh dull white, tender, melting; juicy; core medium size, open; subacid, pleasant, aromatic flavour; quality good to very good; season October to November.

Resembles McIntosh very much in flesh and flavour. Earlier than McIntosh.

Marcus (Northern Spy Seedling).—Large, roundish, ribbed; cavity deep, open, russeted; stem short, stout; basin deep, open, slightly wrinkled; calyx partly open; colour greenish yellow, splashed, and washed with carmine; predominant colour carmine; seeds medium size, roundish, acute; dots moderately numerous, whitish, distinct; skin thick, moderately tough, flesh yellowish, crisp, tender; moderately juicy; core small, open; quality good; season October probably to December.

Does not resemble Northern Spy in outward appearance, but flesh and flavour are very much like Northern Spy.

Monitor (Langford Beauty Seedling).—Large; oblate; cavity open, medium depth; stem short, stout; basin open, medium depth, wrinkled; calyx partly open; colour greenish yellow, well washed and splashed with deep crimson; seeds medium size, obtuse; dots few, whitish, distinct; flesh white, crisp, tender, juicy; core small; subacid, pleasant flavour; quality good to very good; season September and perhaps later.

Resembles Langford somewhat in colour and flesh and flavour. Flavour is Fameuse-like. Promising.

Nemo (McIntosh Seedling).—Medium size; oblate to roundish; cavity open, medium depth; stem medium length, stout, slightly ribbed; basin deep, open, wrinkled; calyx open; colour yellow, well washed with attractive crimson; predominant colour attractive crimson; seeds medium size, acute; dots few, yellow, indistinct; skin moderately thick, tough; flesh yellowish, tender, juicy; core small; subacid, pleasant flavour; quality good; season November, probably to February.

A handsome apple of good quality. About the season of McIntosh, but may be a better keeper. Resembles McIntosh in colour and in flesh.

Nestor (Northern Spy Seedling).—Medium size; roundish; cavity deep, medium width russeted; stem short, moderately stout; basin deep, medium width; nearly smooth; calyx open; colour yellow, washed with attractive crimson; predominant colour crimson; seeds above medium, acute; dots few, yellow, distinct; skin moderately thick, tender; flesh yellowish, crisp, tender, juicy; core small; briskly subacid, pleasant flavour; quality good; season probably November to January.

Resembles Northern Spy considerably in outward appearance, flesh and flavour. Perhaps a trifle small.

Nile (Winter St. Lawrence Seedling).—Medium size; roundish, regular; cavity medium depth and width; stem short, stout; basin deep, medium width, wrinkled; calyx closed; colour yellow, splashed and washed with deep red; predominant colour deep red; seeds medium size, acuminate; dots few, white, distinct; skin moderately thick, tough; flesh white, tender, moderately juicy; core medium; subacid, pleasant flavour; quality good; season November to January or February.

Much like Winter St. Lawrence in outward appearance, flesh and flavour.

Rondo (Salome Seedling).—Small, about the size of Martha crab; roundish to oblate; cavity medium depth and width; stem very long, slender; basin open, shallow; calyx closed; colour yellow, practically all covered with attractive crimson; predominant colour attractive crimson; dots few, yellow, distinct; flesh deep yellow, crisp, breaking; core medium size, open; briskly subacid, little flavour; quality medium to above; season December to perhaps later.

A winter crab apple of handsome appearance. Crab characteristic in stem, skin, flesh and flavour. No resemblance to Salome.

Sandow (Northern Spy Seedling).—Medium size; roundish, ribbed; cavity open, deep; stem short, slender; basin deep, medium width, smooth; calyx closed; colour yellow, well washed with deep crimson; predominant colour deep crimson; seeds medium size, acute; dots few, white, distinct; skin moderately thick, tender; flesh yellowish, crisp, tender, juicy; core medium size, open; subacid, sprightly, pleasant flavour; quality good; season December to late winter.

Resembles Northern Spy somewhat in outward appearance, and in character of flesh and flavour.

Service (McIntosh Seedling).—Medium to above medium in size; roundish conic, ribbed; cavity shallow, medium width; stem short, stout; basin narrow, medium depth; calyx open; colour pale green, washed and splashed with crimson; predominant colour crimson; seeds medium size, plump, elongated at one end; dots few, pale, indistinct; skin moderately thick, moderately tender; flesh white, very tender, fine grained, juicy; core medium subacid, pleasant flavour; quality good; season late November, probably to mid-winter or later.

Resembles McIntosh considerably in outward appearance and in flesh. Flavour is somewhat like Fameuse, but is sprightlier. Promising.

Tasty (Northern Spy Seedling).—Medium to above in size; oblate conic; cavity deep, open, russeted; stem short, stout; basin deep, medium width, wrinkled; calyx closed; colour yellow, washed and splashed with bright crimson approaching orange-red; predominant colour bright crimson; seeds medium size, acute; dots moderately numerous, yellow, distinct; bloom bluish; skin thick, tough; flesh yellowish, tender, juicy; core medium size; subacid, spicy, pleasant flavour; quality good; season October or later.

A handsome apple, slightly resembling Northern Spy in colour, and a little in flavour. Flavour is more like Sops of Wine. Promising.

THE MCINTOSH APPLE AND ITS SEEDLINGS ORIGINATED AT THE CENTRAL EXPERIMENTAL FARM.

The McIntosh apple is in our opinion, the best dessert apple of its season in America. It originated as a chance seedling on the McIntosh homestead, Matilda township, Dundas county, Ontario, Canada, with John McIntosh who found the tree with some others when clearing ground for his shack about 1797. Its dissemination was slow at first. The original tree was still living and bearing fruit until 1907, when a hail storm helped to kill it. It died in 1908, having been in very poor con-

dition for about four years previously due to a fire which scorched it, as it was growing near a building which was burned.

On account of its fine-grained, tender flesh, high flavour and attractive colour, which are characteristic of the Fameuse apple, it is thought to be a seedling of that variety, and while it is quite likely that the supposition is correct this is not certain. It has been demonstrated in the province of Quebec where Fameuse and McIntosh are growing in considerable numbers that the McIntosh tree is hardier than Fameuse, the latter variety having been in severe winters badly injured or killed outright, while the McIntosh has suffered much less. It should p ove interesting to record that practically none of the McIntosh seedlings has been killed by winter at Ottawa, while quite a large proportion of Fameuse seedlings have died from winter injury. The season of McIntosh in that part of Ontario where it originated and in the province of Quebec is from October to February or even to March, a very long season. The Fameuse, on the other hand, has a comparatively short season, coming into condition about the same time as McIntosh but deteriorating rapidly after December. The McIntosh apple averages larger than Fameuse, yields as well, or better, and on account of its greater sprightliness or acidity the fruit is, we believe, liked by more people than the more mildly subacid Fameuse. No apple that we know of, with perhaps the exception of Wealthy, has reached as great a popularity, based on real merit, in as short a time as the McIntosh. So great is the demand for trees in Canada that the nurserymen cannot propagate rapidly enough, and we understand that in the eastern States somewhat the same condition is being experienced.

When seed of the McIntosh apple was planted in 1898 at the Central Experimental Farm, it was hoped that among the seedlings which would be grown there would be some which though not being superior to McIntosh in colour and flavour (as this seemed too much to be hoped for) would, perhaps, extend the season of apples of the McIntosh type, for while it has been said that McIntosh will keep until March in eastern Ontario and Quebec, in parts of the country where the autumn is warmer, and even in seasons in Quebec when it is warm, the McIntosh does not keep that long. In the seedlings which have fruited we have obtained apples of the McIntosh type in season as early as August 31, and others which are not in season until December and which will keep until spring.

The fruit of the McIntosh apple as grown at Ottawa has been described by the writer as follows:—

McIntosh.—Fruit, medium to above medium in size, roundish, slightly ribbed, highly perfumed; skin pale yellow, almost entirely covered with attractive crimson, usually darker on sunny side than on the other parts of the fruit; dots few, small, white, distinct but not prominent; skin thick, tough; cavity of medium depth and width, open; stem short, stout; basin narrow, almost smooth, medium depth to deep; calyx partly open; flesh white and yellowish, crisp, very tender, melting, juicy, subacid, sprightly with a pleasant aromatic flavour. Season October to February, but in best condition during November and December.

The characteristics of sixty seedlings of McIntosh as regards size, form, colour, cavity, stem, basin, calyx, seeds, dots, skin, flesh, core, flavour, quality, season, have been recorded and when a seedling resembles the mother parent in any of the main characteristics this has also been noted.

NOTE.—Apples under $1\frac{1}{2}$ inches in diameter are called very small; between $1\frac{1}{2}$ and $2\frac{1}{4}$ inches, small; $2\frac{1}{4}$ to $2\frac{1}{2}$ inches, below medium; $2\frac{1}{2}$ to $2\frac{3}{4}$ inches, medium; $2\frac{3}{4}$ to 3 inches, above medium; 3 to $3\frac{1}{2}$ inches, large; above $3\frac{1}{2}$ inches, very large.

Only 5 per cent of the 60 McIntosh seedlings described are small apples and but 15 per cent below medium, leaving 80 per cent which are of marketable size.

In shape, 60 per cent are roundish or somewhat of the same type as McIntosh, while 31·67 per cent is oblate. This large percentage of oblate apples is interesting as Shiawassee, another seedling of Fameuse, is an oblate variety.

In 73·33 per cent the predominant colour is crimson, while 15 per cent is green. It has been observed that even a larger percentage of green apples occur in the seedlings of Shiawassee and more than 11 per cent in the seedlings of Langford Beauty. These green apples, or apples where green predominates, have in most instances the tender, fine-grained flesh of Fameuse and a suggestion of Fameuse flavour. One of the named Fameuse seedlings which has been on the market for some years, namely, the Louise, has green or yellow predominating and some of the seedlings of McIntosh, Fameuse, and Langford Beauty are very suggestive of Louise. It may be said, however, that the percentage of green apples among the Fameuse seedlings is much less than among the others as out of 33 Fameuse seedlings which had fruited up to this year, none was green and we recollect but one light coloured Fameuse seedling fruiting this year. The appearance of this light-coloured apple in all the seedlings of Fameuse would indicate that somewhere in the ancestry of Fameuse there was a light-coloured apple.

Passing over what may be called the minor characteristics of cavity, stem, basin, and calyx, it is interesting to record that the seeds of 75 per cent of the seedlings are of medium size, as in the case of McIntosh. In the Gano seedlings fully as great a percentage or greater of the seedlings have large seeds, the mother parent, Gano, having large seeds. It is interesting to note that 76·67 per cent of the McIntosh seedlings have indistinct dots, whereas the dots of the McIntosh, though small, are quite distinct.

The skin of McIntosh is tough and 45 per cent of the seedlings have tough skin and 33 per cent have moderately tough skin.

The tender flesh of the McIntosh is found in 95 per cent of the seedlings and this is what helps to make such a large percentage of the seedlings promising apples.

In flavour 66·67 are subacid like the mother parent, 8·33 per cent briskly subacid; 1·67 per cent acid; 1·67 per cent mildly subacid, and 20·00 per cent sweet. The high percentage of sweet apples among the McIntosh seedlings is surprising. Fameuse up to this year had given only 6·06 per cent of sweet apples; Langford Beauty, 3·7 per cent, and Shiawassee 1·78 per cent. The other mother parents which have given a fairly high percentage of sweet apples are Lawver 20·45 per cent, Wealthy 13·44 per cent, Swayzie 10·71 per cent and Gano 10·20 per cent.

The quality of the McIntosh is good and of the seedlings 50·00 per cent are of good quality and 38·33 per cent more are above medium in quality or 88·33 per cent are better than medium.

The Gano apple is medium or worse in qaulity and up to this year of the seedlings of Gano 71·43 per cent were medium or below medium in quality, 28·57 above medium, and none of good quality.

The season of McIntosh is October to February and of the seedlings 68·34 per cent are in season between October and February, though it is too soon yet to compare accurately the keeping quality of the seedlings with the McIntosh. There is 13·33 per cent which are distinctly better keepers than McIntosh, their season being given as December to April. Of apples the season of which is earlier than McIntosh 5 per cent are in season from August to mid-September, and 13·33 per cent from mid-September to October.

McIntosh is evidently a good mother to use where McIntosh characteristics are desired in cross-breeding.

The following names given to seedlings of McIntosh and the fruit of these varieties has been described in previous Experimental Farm reports or in this report:—are Brock, Carno, Caruso, Garnet, Joyce, Lobo, Melba, Nemo, Service, Seton.

PLUMS.

The area in Canada where the European and Japanese plums can be grown is comparatively limited, but there is a very large proportion of the country where the native plums of the *Prunus americana* and *Prunus nigra* groups can be grown

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Tomatoes and Flowers in Green House, Central Experimental Farm, Ottawa.

successfully. These plums are natives of the prairies and can be grown successfully very far north, both on the Canadian prairies and in Eastern Canada. It is, however, important to obtain more early varieties as the late ones do not ripen. So far, of the early varieties the Cheney, of the *Prunus nigra* group, is the best on the market. Aitkin and Odegard are also two early ones. Seedlings are being grown at the Central Experimental Farm and at the Branch Farms in the hope of getting more and better early varieties.

Following are descriptions of three plums originated at Ottawa, one of which is early; also descriptions of four hybrid plums originated by Prof. N. E. Hansen, South Dakota Experiment Station, which may prove useful where the European and Japanese varieties do not succeed, as they appear hardier in fruit bud. These are being tested on the Branch Farms on the prairies.

Alma (Caro Seedling).—Oval; large, $1\frac{3}{4}$ x $1\frac{1}{2}$-ins.; cavity narrow, abrupt, medium depth; stem slender, medium length, $\frac{1}{2}$ in.; suture a distinct line, not depressed; apex rounded; yellow, thinly washed nearly all over with bright red; dots few, small, yellow; bloom thin, bluish; skin thick, tough; flesh yellow, juicy; stone above medium size, oval, flattened, cling; flavour sweet, rich, but skin slightly astringent and acid; quality good. Americana group. A handsome plum.

Marler (Caro Seedling).—Roundish to oval; large for Americana, $1\frac{1}{2}$ x $1\frac{1}{2}$ ins.; cavity shallow, medium width; stem medium length, moderately stout; suture a distinct line, not depressed, stem more persistent than with most varieties; apex slightly depressed; yellow, covered with bright crimson; dots numerous, yellow, conspicuous; bloom pinkish; skin thick, but moderately tender; flesh yellow, firm, juicy; stone medium size, oval, cling; flavour sweet, rich, good, acid next skin; quality good; Americana group.

A handsome plum and on account of firmness and good quality should be useful. Hangs on tree well.

Mancheno (Cheney x Manitoba Plum).—Oval; size $1\frac{3}{8}$ x $1\frac{1}{8}$ ins.; cavity narrow, medium depth, abrupt; stem medium length, $\frac{1}{2}$ in., slender; suture indistinct; apex rounded; yellow, almost entirely covered with deep red; dots obscure; skin moderately thick, moderately tough; flesh yellow, juicy; stone large, flat, cling; briskly subacid, somewhat astringent, little flavour; quality medium. Nigra group.

An attractive looking plum and earlier than Cheney. May be useful on this account. Cross by Dr. Wm. Saunders.

Inkpa (Prunus Americana x Chinese Apricot, Hansen).—Globular flattened; size medium, $1\frac{1}{16}$ x $1\frac{1}{4}$ ins.; cavity large, wide, fairly deep; suture distinct, depressed; apex slight, depressed; dark plum colour (*i.e.* dark crimson maroon); dots numerous, very distinct, whitish; bloom slight; skin thick, tough, but not astringent or bitter; flesh buff colour to whitish; stone small, cling; very rich, velvety, pear flavour, sweet and pleasant; quality good.

A very distinctive flavour which might be objected to by some people, otherwise a good plum for both dessert and culinary purposes.

Kaga (Hansen).—Somewhat heart-shaped, about size of Lombard or larger, $1\frac{1}{2}$ x $1\frac{3}{4}$ ins.; cavity deep, abrupt, medium width; suture a distinct line, very slightly depressed; apex rounded; yellow, entirely overspread with deep crimson; dots numerous, yellow, distinct; bloom bluish; skin thick, tough; flesh greenish, yellow, firm; juicy; stone below medium size, roundish, cling; quality above medium to good; sweet, subacid, acid next stone and skin, spicy, pear-like flavour. Hybrid group.

An attractive-looking plum with many Japanese characteristics. It is highly perfumed. Appears hardier in flower bud than most European plums. Should make a good shipping plum.

Sapa (Western Sand Cherry x Sultan, Hansen).—Roundish, somewhat heart-shaped; size 1⅛ x 1 ins.; cavity open, deep, abrupt; stem slender, ¾ in. long; suture a distinct line; apex rounded or very slightly flattened; purple, washed with dark purple; dots numerous, very small, yellow, indistinct; bloom bluish, thin; skin thin, moderately tough; flesh dark purple, very juicy; stone medium size, oval, cling; flavour briskly subacid, sprightly, acid next skin, slightly astringent; quality above medium; Hybrid group.

Tastes a good deal like the better sand cherries, but is larger. Fruit buds evidently hardier than most Japanese varieties.

Tokeya (Sand Cherry x Chinese Apricot, Hansen).—Roundish, almost oblate, flattened at ends; size 1 x 1¼ ins.; cavity deep, medium width; stem moderately stout, ½ in. long; suture an indistinct line, slightly depressed; apex flattened; dark red; dots indistinct; bloom thin, bluish; skin thin, moderately tender; flesh greenish, juicy; stone medium size, roundish, cling; acid, bitter flavour; quality below medium. Hybrid group.

Not at all agreeable to eat on account of bitterness.

TOMATOES.

VARIETY TEST UNDER GLASS IN CONJUNCTION WITH ORNAMENTAL PLANTS.

Some glass became available for the use of the Horticultural Division in 1911, a small greenhouse having been placed at its disposal. This is being used part of the time for the propagation of plants for the ornamental grounds, but some other plants are also being grown. In 1911 it was decided to grow tomatoes in conjunction with begonias, the object being to demonstrate the possibility of a person with a small greenhouse having an attractive greenhouse and at the same time obtaining a crop of vegetables. The tomatoes were planted in a single row 15 inches apart on the benches on each side of the walk, sufficiently far back so that a row of begonias could be grown in front of them. As they grew, the plants were tied to wires and kept to single stems and eventually made an arch over the walk, as shown in the illustration. Twenty-one varieties or strains were grown, four plants of each variety except in the case of two, when only two plants were grown. Half the plants of each variety were on each side of the walk opposite one another.

The seed was sown on June 12, in a cold frame and most of the varieties germinated on the 19. The plants were pricked out in a cold frame on June 29, and planted in the greenhouse on July 19. Laterals were pinched out when necessary, and on August 23, the large leaves were pinched back to let more light between the plants, but this severe pinching is believed to have induced a mosaic appearance on the leaves which, however, did not apparently materially affect the vigour of the plants. However, this treatment is not recommended. The flowers were not artificially pollenized, but occasionally the plants were tapped to scatter the pollen.

Following is a table in which are recorded some of the more important records made in this experiment. It is planned to continue the testing of varieties in this small greenhouse as one year's results are by no means conclusive.

Tomatoes—Test of Varieties under Glass.

Name.	Numbers of plants.	Date of first picking.	Date of last picking.	Numbers of pickings.	Largest yield from single plant at one picking.	Date of largest yield from single plant at one picking.	Total yield of ripe fruit.	Average yield per plant of ripe fruit.	Description of fruit and Remarks.
					Oz.		lbs. oz.	lbs. oz.	
Industry O.A.C. Selected 1910....	4	25-9-11	19-1-12	16	17½	10-10-11	24 11½	6 2¾	Oval, smooth and uniform, flesh firm, juicy, acid, one of the best varieties; fruits above medium size, first class quality and heavy cropper. Scarlet.
Sutton's Satisfaction...	4	28-9-11	19-1-12	15	17	27-10-11	23 12	5 15	Roundish, smooth, uniform in size and colouring, flesh firm and juicy, sweet, one of the best varieties in the house. Scarlet.
Industry O.A.C. Selected 1910-11	4	2-10-11	19-1-12	15	20¼	10-10-11	23 2½	5 12½	Irregular globular, smooth, uniform in size and colour, flesh soft and watery, not much inflavor or quality but heavy cropper and fruit has a very fine appearance. Scarlet.
Livingstone's Globe...	4	5-10-11	19-1-12	13	18½	10-10-11	21 10¼	5 6½	Globular, smooth slightly corrugated at base, irregular in form, size and ripening; flesh ripens unevenly but of very good quality. This variety is one of the best in all points except that the flesh ripens so very unevenly. Purplish-pink.
Dobbies' Champion	4	28-9-11	19-1-12	15	24	16-10-11	20 6	5 1½	Roundish, slightly corrugated, uniform in size and colour, flesh soft and watery, melting and sweet. One of the very best varieties. Scarlet.
Bonny Best....	4	25-9 11	21-12-12	12	26½	31-10-11	19 14	4 15½	Roundish, flattened, very smooth, uniform in size and colour, flesh soft and watery slightly acid. A very fine variety.
Spark's Earliana C.E. F. $\frac{2}{12}$.	4	22-9-11	21-12-12	12	18¾	27-10-11	13 15	4 11¾	Globular, deeply corrugated, irregular in size, flesh soft and watery ripening irregularly quality poor, flesh soft and watery. The plants being mildewed had no doubt some effect on the quality of the fruit. Scarlet.
Early Wealthy..... ..	4	10-10-11	21-12-11	9	29¾	16-10-11	18 12¼	4 11	Roundish, smooth slightly corrugated, uniform in size and colour, flesh soft and watery ripens unevenly. A good variety retaining uniformity in size and colouring, the only drawback being that the flesh does not ripen evenly. Scarlet.

TOMATOES—TEST OF VARIETIES UNDER GLASS—*Continued.*

Name.	Numbers of plants.	Date of first picking.	Date of last picking.	Number of pickings.	Largest yield from single plant at one picking.	Date of largest yield from single plant at one picking.	Total yield of ripe fruit.		Average yield per plant of ripe fruit.		Description of fruit and remarks.
					Oz.		Lbs.	Oz.	Lbs.	Oz.	
Winter Beauty.....	4	25–9–11	19–1–12	14	12	16–10–11	18	8½	4	10	Roundish, smooth, slightly corrugated, irregular, flesh soft, watery and slightly acid. This variety is of poor quality and the fruit below medium size. Scarlet.
Improved Express (Sherrington)...	4	25–9–11	21–12–11	13	18½	27–10–11	18	5	4	9¼	Roundish, very fine, smooth, uniform in size and colour, flesh firm, juicy and slightly acid, fine large well formed fruits but not many of them. Scarlet.
Clipper O.A.C.	4	10–10–11	19–1–12	12	18½	10–10–11	18	4½	4	9¼	Roundish, smooth, uniform in size and colour, of perfect form, flesh firm and solid, melting and juicy slightly acid. Good quality and flavour. A most desirable variety. Scarlet.
Chalk's Early Jewel....	4	25–9–11	19–1–12	11	19½	29–11–11	17	13¼	4	7¼	Roundish, smooth, varying in size very much, flesh firm melting and very sweet, rich and juicy. Taken on the whole this is one of the finest formed and richest flavoured varieties but it is not a heavy cropper. Scarlet.
Cox's Earliest C.E.F.....	4	28–9–11	19–1–12	12	17¾	5–10–11	16	13	4	3¼	Globular, smooth, uniform in size and colour, flesh firm, solid, rich, melting and sweet. A fine variety uniform in all points, a light cropper. Purplish-pink.
Sutton's AI	4	28–9–11	19–1–12	14	14½	10–10–11	15	11½	3	14¾	Globular, slightly corrugated, of fine form but vary in size very much, flesh firm juicy and sweet. A fine variety, flavour and quality good. Scarlet.
Clipper O.A.C. Selected 1910.....	4	28–9–11	19–1–12	13	20	31–10–11	15	8¾	3	14	Roundish, perfectly smooth, uniform in size and colour, fruit firm, watery and slightly acid. A very uniform and fine fruit but a rather light cropper. Scarlet.

Early Dawn	4	22-9-11	21-12-11	15	10	27-10 11	14	12¼	3	11	Roundish, smooth, uniform in size but rather small, flesh soft, rather insipid, very slightly acid. Very small, of no value except for a few early fruits. Scarlet.
Sparks' Earliana Improved Strain No. 10, Johnson.	2	5-10-11	21-12-11	10	20¾	10-10-11	10	3	5	1½	Very irregular and angular, deeply corrugated, not at all uniform, flesh soft and watery, slightly acid. Not a desirable variety. Scarlet.
Spark's Earliana C.E.F.	2	28-9-11	21-12-11	10	18¼	7-10-11	8	7¼	4	3½	Globular, slightly corrugated at base, not uniform, fruits varying in size very much, flesh firm and juicy, evenly ripened, fruits a good marketable size and quality, coming in early. Scarlet.
Watt's Wonder	4	25-9-11	19-1-12	11	11	16-10 11	8	1	2	0¼	Roundish, smooth, uniform in size and colour, flesh soft and watery, slightly acid. Only three plants bore fruit and those a very light crop. Scarlet.
Frogmore Selected	4	2-10-11	19-1-12	8	11	10-10-11	7	11¼	1	14¾	Roundish, smooth, uniform in size, some fruits deeply corrugated, others only slightly so, flesh fairly firm, unevenly ripened. A very light cropper and a bad feature of this variety is the fruit ripening so very unevenly. Only three plants of this variety bore any fruit. Scarlet.
Improved Conference	4	2-10-11	19-1-12	8	7¾	31-10-11	5	4¾	1	5	Globular, smooth, uniform in size and colour, flesh rich, juicy and ripened evenly, very good quality what there is of it but the poorest cropper in the house. Only three plants bore any fruit. Scarlet.

ORNAMENTAL GROUNDS.

During the past year, in addition to planting the herbaceous border referred to in another part of this report, in which it is planned to grow the best varieties of herbaceous perennials, the collections of phloxes, iris, paeonies, lilies, gladioli, etc., have been very much improved and increased by the addition of a large number of the newer sorts. A special effort is also being made to get together a representative collection of hybrid tea roses as these roses are becoming extremely popular in Canada and it is important to learn which varieties look and bloom best and which are the hardiest.

HARDY ROSES AND THEIR CULTURE.

There are few persons in Canada who love flowers but who desire to grow roses, but unfortunately there are comparatively few who get beyond the desire, or if they plant some bushes their experiment is often a failure. The rose has the name of being a difficult flower to grow, and this is true as compared with many other ornamental shrubs or herbaceous plants. There are some roses, however, that are very easy to grow and those who are not prepared to give the hybrid perpetual, hybrid tea, and tea roses the attention their beauty merits will find in the Rugosa hybrids, the Austrian briars, Provence or Cabbage, and Damask roses a very good assortment which are hardy and of easy culture, requiring little pruning and not being troubled much with insects or fungous enemies.

The roses usually cultivated in Canada may be divided into four groups so far as hardiness is concerned.

Hardiest Group.—Rosa rugosa and hybrids, Austrian Briars, Provence or Cabbage roses, Damask roses and Moss roses.

Roses of the second degree of hardiness.—Hybrid Perpetuals or Hybrid Remontant, Climbing roses of the Multiflora group, and Dwarf Polyantha roses.

Roses of the third degree of hardiness.—Hybrid Tea roses.

Roses of the fourth degree of hardiness.—Tea roses.

The hardiness of the individual varieties varies considerably within the groups.

Roses of the first group need little or no protection in some parts of Canada. The others must be protected except in very favoured localities.

Site and Soil.—The rose requires an abundance of sunlight for best results and where possible a site should be chosen where the plants will be in sunshine most of the day. If this is not practicable the next best site is one where the bed will get the morning sun but will not be in such a position that the heat of the midday or afternoon sun will be reflected from some wall or building, for in this burning heat both flowers and plants will suffer. South or southeastern exposures are desirable. As roses need an abundance of moisture the bed or garden should not be within reach of the roots of trees which would exhaust the soil of much moisture and plant food as well. On the prairies it is desirable to have the bed where it will not be much exposed to winds and also where the snow will lie well, if possible. This applies, however, to other parts of Canada as well. Just in proportion to the hardiness of roses from the standpoint of winter so is the relative care in the selection of soil for the rose plantation necessary. Roses of the hardiest group will do well on a great variety of soils; roses of the other groups are more fastidious, for while the hybrid perpetuals succeed best in a cool but well-drained clay loam, the tea roses should have a warmer soil, a sandy loam being preferable. However, where it is possible to do so, an intermediate type of soil may be chosen which will suit all the groups. In England, roses succeed much better than in most parts of Canada, the moister air and cooler soil suiting them better than the dry air and hot soil which they are liable to endure in many parts of Canada. A soil, then, should be chosen which is naturally cool, and cool soils are usually those with considerable humus and having a good capacity for

holding moisture. Clay loams are usually naturally richer than sandy loams and as the rose requires a liberal amount of plant food the heavier soils have an advantage in this respect also. Shallow soils should not be chosen for roses as these are liable to become very dry and warm in drought, making conditions unfavourable.

Soils where water lies within three feet of the surface should not be chosen, as such soils are cold and roses will not bloom well in them. Often roses in such soils will make strong growth and will not bloom, puzzling the grower. The soil should be cool, but well-drained, deep and rich, and if it is not this naturally and there is no choice of sites it should be made as nearly like this as possible. Even soils of good quality naturally should be well enriched with well-rotted barnyard manure before the roses are planted, working it well down and through the soil. In order to make a good bed for roses where the soil is not naturally deep and where there is poor drainage, first remove the good soil from the surface, then remove the lower soil so that about two feet in depth of soil is removed altogether. Then if the soil needs drainage, lay three-inch tile on the bottom with sufficient fall to carry the surplus water away having, of course, some outlet for it. If this tile draining is not practicable some gravel or small stones below the two feet of soil will help to drain it. Put good surface soil from somewhere else, preferably with some clay in it, on the bottom, spread a heavy coat of rotted manure on it and dig it in. Then put back the surface soil which has been removed from the bed, or better soil if it is poor, and again dig manure into this. This should make a good bed for roses. The soil should be allowed to settle for a month before the roses are planted, for best results. The kind of preparation of the soil outlined above, while ensuring good results, is not necessary and no person should be deterred from growing roses because of the careful preparation recommended. Roses may be planted in almost any good loamy soil with fair results, provided the soil is neither very wet nor very dry.

Plants and Planting.—Strong, two-year-old budded plants are the best to plant. Yearling plants, while cheaper, do not make much show the first year and one is liable to be discouraged before the next season comes round. Some roses do very well on their own roots, while others are not very vigorous. On the whole, budded plants are the best. The autumn is the best time to plant roses, preferably just before winter sets in. Sometimes, however, roses though ordered for autumn delivery do not reach one in time, in which case a good plan is to heel them in in unfrozen soil by digging away the frozen soil and burying the roots and a large proportion of the stems. The novice in rose culture is, however, more likely to obtain his roses in the spring and it is for this reason that so many failures occur. By the time the plants reach their destination they have often begun to wither and when planted in this condition are almost sure to die. Conditions are made much worse when the plants come in May when the weather may be hot and the winds and soil dry. Tea roses should be planted about fifteen inches apart; hybrid teas about eighteen inches; hybrid perpetuals about three feet, and the Rugosa hybrids, moss roses and other hardy sorts about four feet. If the roses are planted in the autumn they should not be pruned back at that time, but left until spring. If, however, they are planted in the spring it is necessary to prune back severely when planted. The bushes should be planted deep enough so that the point of union between stock and scion is from two or three inches below the surface of the ground. This is important as if the union is at or near the surface, the sun shining on it hardens the wood and prevents a free circulation of sap, which is not desirable, as for best results a strong, vigorous growth is necessary. When planting, the soil should be well tramped about the bush to bring the particles into close contact with the roots and ensure their getting moisture as soon as possible. Roses have comparatively few roots and none of these should be pruned off when planting, unless there should happen to be a very long root preventing proper planting, when its length may be reduced or if there are broken roots they should be removed. The roots should not be exposed to drying

winds when planting any longer than is absolutely necessary. A very good plan, and one we should strongly advise following, is to dip the roots in a puddle made of clay and water. This coating of clay on the roots not only protects the roots when the bushes are being planted, but we believe ensures a quicker flow of moisture to the roots in the soil. If the stems look withered when they are received, the plants should be buried for about two days in wet soil so that the stems may take up water from the soil. This will often save plants which would otherwise die. In addition to this it is desirable if the weather is very dry at planting time, to heap the soil up around the stems until there is rain. When the plants are set in the autumn the soil should be heaped up around the stems to protect them. In the spring this is removed and the plants severely headed back. One should not hesitate to reduce the stems so that there will be only from three to six buds left on each of the stems above the ground. This severe pruning is even more important in the case of spring set plants, and is often the means of saving the plants which would otherwise die.

Cultivation and Watering.—As has been stated before, roses need an abundance of moisture. By keeping the surface soil loose from spring until autumn much moisture which would otherwise pass off into the air will be held in the soil. After each rain the surface should be hoed and raked, or during a dry time, if it has been necessary to water the roses, the soil should be loosened after watering. It is better to water roses thoroughly, occasionally, than to give them a light watering frequently. It is not, however, too often to syringe or spray the foliage with water every day as this is one of the best preventives of insects. The syringing is, however, for the purpose of cleansing the foliage not for adding moisture to the soil. This spraying should be done in the evening or early in the morning as if the foliage is wet in the middle of a hot, dry day it is liable to scald.

Manuring.—Soils should be kept rich and well supplied with humus by the annual application of well-rotted barnyard manure in large quantities. This may be applied on the surface of the ground in the autumn and dug in in the spring or applied in the spring.

Pruning.—The pruning of roses will vary according to the kind and even the variety of rose which is to be pruned. Roses of the hardiest group nearly all bloom on wood of the previous season's growth or wood several years old, and as these roses are grown mainly for the mass effect of their flowers rather than the excellence of the individual flower, they should be pruned so as to produce this mass effect. If, then, they are pruned back to near the ground there will be few roses. If the branches and stems are left their full length or merely headed back a little to make the bush symmetrical there will be a fine mass of roses. In addition to this it is necessary to remove some of the oldest wood each year, cutting the branches out at the ground, thus making room and letting in light so that the younger stems will develop well. As the stems one and two years old are those which give the best flowers there should be a large proportion of these. Dead branches should, of course, be removed.

Most of the roses in the second group must be pruned differently, although the climbing roses may be treated somewhat as has been recommended for the first group, with this exception that, where it is desired to cover a wall with a large rose bush, the old canes must be left to a greater age so as to provide for lateral branches. The Hybrid Perpetual roses give best results so far as quality of bloom is concerned under hard pruning. To obtain the finest flowers one must relentlessly cut back the bushes each spring to within six to twelve inches of the ground. If, however, a mass effect is desired the bushes may be left taller, and where the conditions of soil are exceptionally good, bushes which have not been pruned back severely will give a large number of fine blooms. Experience will soon teach what is the best method

of pruning for particular conditions or desires. The stronger varieties do not require as severe pruning as the less vigorous, and sometimes very few blooms are obtained when a very vigorous variety is cut back to near the ground as the very strong growth which follows is without bloom. It is better to prune early in the spring rather than in the autumn as one never knows how a plant will come through the winter. In pruning, the strongest, healthiest stems are left and the weak ones cut off at the ground. In pruning, leave an outside rather than an inside bud as the top bud, so that the shoot from this bud will grow outward rather than through the plant.

Hybrid Tea roses are pruned much like hybrid perpetuals though usually not so severely. Tea roses, which usually kill to near the ground in Canada, if they live through the winter at all, should have the dead and injured wood removed, and if the wood should not be injured the branches should be pruned back about one-third. It is extremely important to remove suckers or roots springing from the stock on which the rose is budded. These should be removed as soon as noticed and careful watch kept for them. They should be cut off close to the stock and not at or above the ground. It may be necassary to take away a little soil to do this. There is no reliable way of telling the stock, but experience will increase the knowledge in this respect, but vigilance is necessary or the stock will assert itself and soon the rose one thinks he is growing will not be there. The leaves of the stock are often of a paler green colour than the named varieties and not so glossy. Sometimes the leaves of the stock have a purplish tinge. Usually the stocks have a larger number of leaflets on the leaves than the named varieties.

Winter Protection.—Roses of the first group need little or no protection in many parts of Canada. In the Prairie provinces, where the country is open, it is desirable to bend some of them down and cover them with soil and, where evergreen boughs can be obtained, to put some of these over them as well. A little soil taken from one side of the bush will enable one to lay the bush flat down so that the whole of it may be covered. Should the ground freeze and snow fall so that the bush cannot be covered, a good plan is to tie the branches together and then tie over the branches some evergreen boughs, canvas, straw or any material which will protect the bush both from wind and sun. The material should be of such a nature that it will protect the plant but at the same time not hold moisture for any length of time, as if the canes are moist for a considerable time they may mould. For hybrid perpetual, hybrid tea, and tea roses more protection is necessary. One of the simplest methods of protecting both hybrid perpetual and hybrid tea roses is to earth them up six or eight inches or more in the autumn, thus protecting the lower part of the stems, and if the tops are killed back the lower part of the stem is almost sure to remain alive. In addition to this the plant may be bent down and held down with soil or where bushes are not usually pruned back severely they may be entirely covered with soil to preserve them. Where this treatment is not sufficient, a light covering of straw or evergreen boughs over the soil is desirable, which will prevent sudden thawing and freezing and may save the plants sometimes. If the soil is frozen deep before one thinks of covering, the bush may be bent down and held down with boards and covered with evergreen boughs, or even without these the snow may be sufficient protection. In the spring the soil should be levelled and the bushes raised as soon as possible to prevent the development of disease. Good results are obtained where the preceding method fails by bending the bushes down and covering them with a box, and still further protection is afforded by bending down, putting a box without cover or bottom over, then filling this with dry leaves and putting a cover on the box, which should be tight. If the leaves are wet when put in or if they become wet in the spring the stems may mould. When boxes are used the cover should be raised at the first opportunity in the spring to allow a freer circulation of air and permit the stems to dry and the bark harden a little before removing the box altogether.

Climbing roses may be taken down, the branches tied together and put in a long, narrow box and treated as described, if it is found necessary. Tea roses are the most tender and they should be earthed up as described for hybrid perpetuals and hybrid teas, and in addition, for best results, covered with a box filled with dry leaves as described. The degree of protection will depend on what part of Canada the grower lives in, but at least one of the methods described should be suitable for most conditions.

Insects and Fungous Enemies and How to Treat them.—Good foliage is essential to the production of good roses, and, moreover, good foliage is desirable in a rose garden because of its appearance. Leaves badly curled, mildewed, spotted or eaten take away very much from the attractive appearance of a rose garden. The easiest insect to control is the Rose Slug, a green caterpillar which does not usually appear in great numbers but which works on the underside of the leaves and eats out pieces. These may be picked off by hand where bushes are few, but Paris green or hellebore sprayed on the bush so that it will reach the undersides of the leaves especially will quickly kill them. If Paris green is used it should be used weak so as not to burn the foliage, or about in the proportion of 1 ounce to 12 gallons of water. Hellebore is used in the proportion of 1 ounce to 2 gallons of water.

The Aphis or green fly is sometimes quite troublesome, and the thrips, small, hopping insects which cause the leaves to curl, often do much harm unless controlled. There are several good remedies for these, and, as prevention is better than cure, a remedy should be applied before the insects have increased in numbers. As stated before, thorough spraying with water is a good preventive. First, nicotine in the proportion of one teaspoonful to one gallon of water or a decoction made of quassia chips and soft soap or whale oil soap made by boiling four ounces of quassia chips for ten minutes in a gallon of soft water, then strain and while the liquid is still warm dissolve four ounces of soft soap or whale oil soap in it and before using add one gallon of water. It may be necessary to syringe with water after the insects are killed to clean the plants.

Whale oil soap in the proportion of 1 lb. to 6 gallons of water is a good insecticide to use for aphis or thrips and kerosene emulsion is a reliable remedy, but if improperly made the foliage may be injured.

The same remedies may be used for Red Spiders, tiny insects, the presence of which is indicated by a yellowing of the leaves. These insects work on the underside of the leaves and unless the eyesight is good cannot be detected with the naked eye. Thorough and frequent syringing of the underside of the leaves with water alone will help to keep these insects under control, and flowers of sulphur mixed with kerosene emulsion or whale oil soap will make these insecticides more effective.

Where the Powdery Mildew is troublesome it may be controlled by sprinkling the bushes every ten or twelve days with flowers of sulphur until the disease disappears. The Leaf Blotch or Black Spot is another disease which sometimes disfigures the leaves very much and weakens the plant. Bordeaux mixture and Ammoniacal Copper Carbonate Solution will control this, but if the former is used it should be used several weeks before the blooming season or after it, so that the foliage will not be disfigured by the spraying material when the roses are in bloom. When the disease is in a plantation, every effort should be made by thorough spraying to control and destroy it as soon as possible.

Best Varieties of Roses.

MISCELLANEOUS HARDIEST VARIETIES.

Rugosa Hybrids.—Mad. Georges Bruant (white, double), Blanc Double de Coubert (white, double), Conrad F. Meyer (clear, silvery rose, double), Madame Charles

Worth (rosy-carmine, semi-double), Agnes Emily Carman (crimson-red, semi-double), Mary Arnott (carmine-red, semi-double).

Austrian Briar.—Persian Yellow (yellow, double).

Damask.—Madame Hardy (white, double).

Hybrid Perpetual.—Madame Plantier (white, double).

Moss.—Old English Pink, Crested, and Blanche Moreau.

Hybrid Perpetual—Hardiest and Best Ten.—Frau Karl Druschki, Magna Charta, General Jacqueminot, Mrs. John Laing, Ulrich Brunner, Baronne de Bonstetten, Mrs. R. G. Sharman-Crawford, Madame Plantier, Madame Joly, John Hopper, Prince Camille de Rohan, and Pierre Notting. (For description, see other lists.)

Best Ten:—

Frau Karl Druschki (the best white rose).
Ulrich Brunner (cherry-crimson; of good form; very fragrant).
General Jacqueminot (crimson-scarlet; a popular rose; fragrant).
Mrs. John Laing (soft pink, and of good form; a free bloomer; fragrant).
Magna Charta (bright rose; one of the most reliable).
Charles Lefebvre (velvety crimson; good form; fragrant).
Capt. Hayward (scarlet-crimson; good form, fragrant).
Margaret Dickson (white with pale flesh centre; fragrant).
Mrs. R. G. Sharman-Crawford (deep, rosy-pink; outer petals shaded with pale flesh.
Clio (flesh colour, shaded with rosy-pink).

Second Best Ten

Earl of Dufferin (rich velvety crimson, shaded maroon; fragrant).
Baronne de Bonstetten (velvety blackish-crimson).
Countess of Rosebery (deep rose; fragrant).
Duke of Edinburgh (very bright vermilion; fragrant).
Baroness Rothschild (pale rose; slightly fragrant),
Her Majesty (clear, satin-rose).
Hugh Dickson (brilliant crimson, shaded scarlet; fragrant).
Fisher Holmes (deep crimson; fragrant).
Etienne Levet (carmine-red; fragrant).
Madame Gabriel Luizet (light, silvery-pink; very slightly fragrant).
Anna die Diesbach (attractive carmine; fragrant).
Helen Stewart (bright crimson, approaching scarlet; fragrant).
Prince Camille de Rohan (deep, velvety-crimson).
Alfred Colomb (deep, reddish-pink; fragrant).

List of the Twelve Best Hybrid Tea Roses.

1. Caroline Testout—Satin rose with brighter centre; fragrant.
2. Dean Hole—Silvery carmine shaded salmon; fragrant.
3. Etoile de France—Velvety crimson, red centre; fine form.
4. Gruss an Teplitz—Very bright scarlet crimson; free bloomer; semi-climber; fragrant.
5. J. B. Clark—Deep scarlet shaded with blackish crimson; fragrant.
6. Kaiserin Augusta Victoria.—Cream slightly shaded lemon; fragrant fine form.
7. Killarney—Flesh shaded white suffused with pale pink; fragrant; fine form.

8. La France—Bright pink; very fragrant.
9. Madame Abel Chatenay—Carmine rose shaded salmon; very free flowering; fine form.
10. Madame Ravary—Golden yellow; very free flowering.
11. Mrs. Aaron Ward—Yellow washed with salmon rose; a beautiful rose.
12. Theresa—Deep orange apricot tinged carmine; fragrant.

Other popular varieties are Betty, Mildred Grand and Viscountess Folkestone.

Some Hybrid Tea Roses, which give promise of great excellence, selected from varieties planted in 1911, at the Central Experimental Farm.

Red and shades of red:—

1. Laurent Carle—Velvety crimson.
2. Rhea Reid—Cherry red and crimson.

Pinks and shades of pink:—

3. Colonel R. S. Williamson—Light pink almost white.
4. H. Armitage Moore—Rose and silvery pink.
5. Yvonne Vacherot—Pink and coral white.

Flesh and shades of salmon:—

6. Antoine Rivoire—Rosy flesh tinged yellow.
7. Dorothy Page Roberts—Pink and salmon.
8. Dornroschen—Flesh coloured.
9. Grace Molyneux—Apricot and flesh colour.
10. Margaret Molyneux—Saffron yellow and apricot
11. Lady Helen Vincent—Salmon and pink.
12. Mrs. William Cooper—Rosy flesh.
13. Queen of Spain—Pale flesh.
14. Souvr. du Président Carnot—Flesh and white.

Yellows:—

15. James Coey—Yellow to white.
16. Le Progrès—Golden yellow.

Whites and cream shades:—

17. Emiliano Oliden—White, tinted carmine.
18. Marie Mascauraud—White, slightly salmon.

Six of the best and most popular Tea Roses.

1. White Maman Cochet—White, tinged lemon.
2. Maman Cochet—Deep flesh, suffused light rose.
3. Madame Jules Gravereaux—Flesh, shaded yellow.
4. The Bride—White, tinged lemon.
5. Bridesmaid—Bright pink.
6. Souvenir de Pierre Notting—Apricot yellow, shaded orange.

Hardiest and Best Climbing Roses—

Crimson Rambler (crimson, double).
Dorothy Perkins (soft, light pink).

Tausendschon (pink, rosy-carmine when opened; not thoroughly tested; promising).

Gloire de Dijon and Marechal Niel, climbing roses, are grown with success in the southern part of Vancouver Island.

DWARF ROSE.

Madame N. Levavasseur (Baby Rambler) (rosy-crimson; good for massing in beds).

The Prairie Climbing roses are not satisfactory in Canada except in the most favoured locations. The Penzance Sweet Briars are also only adapted to the warmest parts. Of these the Lady Penzance, a very striking single rose of a coppery colour, appears to be the hardiest. The Wichuriana hybrids are not hardy enough in Canada except in the warmest parts of the Dominion.

HYBRID ROSES TESTED AT OTTAWA.

There has been a rose garden at the Central Experimental Farm since 1891, and during the past twenty-one years a large number of varieties has been tested. Before removing the old plantation in the autumn of 1911, notes were taken on the varieties which had proved hardiest, and in the following table these and other notes are given. To define the degree and quality of perfume which these roses have, the x mark has been used, three x's being the highest degree of perfume, and one x the lowest where there was any perfume. The rank indicates the relative general quality of the variety.

Hardiest Roses at Ottawa.

Name.	Planted.	Rank.	Colour.	Degree of Fragrance.	Remarks.
Hybrid Perpetual Roses.					
A. Red and shades of Red—					
1 Abel Carriere	1899	Between 1st and 2nd.	Purple-crimson	xx	
*2 Bessie Johnson	1896	Second	Red fading to mauve.	xx	
3 Baronne de Bonstetten	1894	First	Blackish-crimson	xxx	Bush of vigorous habit.
4 General Jacqueminot	1897	Between 1st and 2nd.	Crimson-scarlet	xx	Bush moderately vigorous
5 Pierre Notting	1901	Between 1st and 2nd.	Deep-crimson	xx	A late rose.
6 Prince Camille de Rohan	1897	Second	Velvety-crimson	xx	
*7 Souvenir de Duchess	1896	"	Blackish-crimson	x	Moderately vigorous.
8 Thomas Mills	1894	"	Crimson	xx	
B. Pink and shades of Pink—					
*9 Baronne Prevost	1895	"	Deep rose-pink	xx	Bush, vigorous.
*10 Comtesse Cecile de Chabrillant.	1894	"	Deep pink	xx	
11 Comtesse d'Oxford	1894	"	Reddish-pink	xxx	
12 Caroline de Sansal	1894	"	Rose-pink	xx	
*13 Catherine Soupert	1899	First	Shell pink	xx	
*14 Louise Odier	1895	"	Good pink	x	Very free bloomer.
15 La Reine	1901	Second	Carmine pink	xx	Very open type.
*16 Madame Gomet	1896	"	Bright pink	xx	Very free bloomer.
*17 Madame Joly	1894	First	Medium pink	xx	Bush, vigorous; long season; flowers of good form.
18 Magna Charta	1897	"	Deep pink	x	Free bloomer.
19 Madame Gabriel Luizet	1894	"	Coral rose	x	Long season.
20 Oakmont	1894	Second	Pink colour	x	Good bloomer.
21 Victor Verdier	1894	Between 1st and 2nd.	Carmine rose	xx	
22 Madame Plantier (white)	1897	First	Pure white	xx	Vigorous; free bloomer; one of the best white roses.
Miscellaneous Roses.					
Moss Roses—					
23 Blanche Moreau	1894	First	White	xx	Free bloomer; very vigorous.
24 Perpetual White Moss	1896	Second	"	xx	
25 Centifolia	1894	Between 1st and 2nd.	"	xx	Free bloomer; vigorous.
26 Glory of Mosses	1896	First	Red to mauve	xx	Free bloomer.
27 Other Named Moss Roses	1894	Second	Shades of pink and red.	xx	All vigorous.
Rugosa Roses—					
28 White and Red Rugosa	1897 and later.	First	White and shades of pink and mauve		Both single and double form.
Damask Rose—					
29 Madame Hardy (white)	1894	Second	White fading pinkish.	x	Vigorous.
Rugosa Hybrids—					
30 Madame Geo. Bruant	1894	First	White	xx	Vigorous.
31 Madame Chas. Worth	about 1897	"	Rosy carmine	x	Vigorous.
32 Agnes Emily Carman	1894	"	Crimson red	x	Very free bloomer.
33 Mary Arnott	about 1897	"	Carmine red	x	Specially free bloomer; flowers in fine clusters.

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HARDIEST ROSES AT OTTAWA—SECOND LIST.

The asterisk indicates that these roses are now no longer obtainable at most nurseries. In many cases their places have been taken by roses of better colour or better form. The Hybrid Tea roses, which in most cases are of superior colour, form, and length of blooming season, are also fast taking the place of many of these older Hybrid Perpetual Roses. Several hundred of these latter are now under test at the Central Farm.

The second list of Hybrid Perpetuals which follows here contains those roses which have been growing at the Farm for periods varying from five to ten years and have up to the present shown satisfactory indications of hardiness and vigour which are the two points of merit in which those in the first list showed the greatest superiority. Full details are not given as many of them are still under test.

HYBRID PERPETUAL ROSES (2).

Red and Shades of Red—

34. Anna die Diesbach, carmine.
35. Duke of Connaught, velvety crimson.
*36. Empress of India, light crimson.
37. Horace Vernet, velvety red.
*38. King of Sweden, dark crimson.
39. Lady Helen Stewart, dark crimson.
40. Madame Victor Verdier, cherry red.
41. Marie Rady, brilliant red.
42. Reynolds Hole, rich maroon.
43. Ulrich Brunner, cherry crimson.

Pink and Shades of Pink—

*44. Clara Cochet, deep pink to red.
45. Duchess de Morny, bright rose.
46. John Hopper, rose pink.
47. Merveille de Lyon, light pink white centre.
48. Mrs. John Laing, clear pink.
49. Mrs. R. G. Sharman-Crawford, rose pink.
50. Paul Neyron, deep rose.

MISCELLANEOUS ROSES.

51. Sir Thomas Lipton, white Rugosa hybrid.
52. New Century, pink Rugosa hybrid.
53. Universal Favourite, rose climber (Wichuriana hybrid).
54. Lady Gay, pink climber.
55. Crimson Rambler, crimson climber.
56. Dorothy Perkins, bright pink climber.
57. Persian Yellow, yellow rose.
58. Harrison's Yellow, deep yellow.

REPORT OF THE DOMINION CEREALIST

CHARLES E. SAUNDERS, B.A., PH.D.

OTTAWA, March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director of Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the ninth Annual Report of the Cereal Division, in which a brief synopsis is given of some of the principal investigations carried on between April 1, 1911 and March 31, 1912.

The season of 1911 was unfavourable for cereals in many districts, and the results of the year are therefore not so satisfactory as might have been expected. The excessive heat at Ottawa did considerable damage to nearly all crops, especially to peas and flax, the latter being indeed almost a total failure.

At several of the branch Farms and Stations the crops were not so good as usual. In the Prairie Provinces considerable damage was done by rain, frost and hail.

In some respects, however, the unusual conditions served a good purpose, since they brought out clearly the superiority of some of the new varieties of grain which have been produced on the experimental farms.

The erection of a suitable building for the use of the Cereal Division at Ottawa has made it possible to carry on the work in a much more efficient and satisfactory manner. The full advantage of the new accommodations could not, however, be obtained this year as some of the important details in the internal structure are not yet finished.

My thanks are due to my Assistant, Mr. H. Sirett, B.S.A., for the valuable help he has given to me in many directions, to the foreman in charge of the field work at Ottawa and of the distribution of seed grain, Mr. Geo. J. Fixter, for the accuracy and care with which he has performed his work, to Mr. Wm. Ellis for his careful reports on the germination tests of grain, and to my stenographer, Miss Gertrude Ker, for the willing manner in which she has discharged her duties, especially when dealing with the very heavy correspondence of the winter months

The other members of the permanent staff of the Division I wish also to thank for the interest they have displayed in performing the work which has been assigned to them.

I have the honour to be, sir,
Your obedient servant,

CHARLES E. SAUNDERS,
Dominion Cerealist.

JOURNEYS.

In the months of June and July I visited the branch Farms and Stations in the Provinces of Manitoba, Saskatchewan and Alberta. At that period most of the crops were in excellent condition.

On July 28, I sailed for England for the purpose of seeing some of the experiment stations in that country and on the continent and also in order to be present at the Fourth International Conference on Genetics in Paris in the month of September.

The principal experimental stations, laboratories, and trial grounds visited were those at Rothamsted, Reading, Woburn, Cambridge, Warrington (Garton Bros.) and Raynes' Park (Carter's) in England, Svalöf in Sweden, Verrières (Vilmorin-Andrieux et Cie.) near Paris, and the Swiss Botanical Station at Lausanne. At all of these stations I was treated with great kindness and was given an opportunity of studying the methods of work and the results of the experiments which are being carried on.

MEETINGS.

The Conference on Genetics at Paris, France, was a notable gathering which included most of the leading men engaged in the study of heredity in plants and animals. The Conference lasted from September 18 to 23, and the programme embraced five sessions, of about three hours each, for business, and five excursions and visits to important institutions. I presented (in French) a paper dealing with some of the work of the Cereal Division under the title 'Breeding Varieties of Wheat of High Baking Strength.' In addition to the business sessions, receptions and other social gatherings were held, so that the members of the Conference had ample opportunity to become acquainted with one another.

The utmost kindness and hospitality were shown to every one present, especially to the members from foreign countries

Other important meetings which I attended during the past twelve months were as follows:—Convention of Operative Millers and Exposition of Milling Machinery at Detroit, Mich., in June; Annual Meeting of the American Association of Milling and Baking Technology at Washington, D.C., in November; Annual Meeting of the Canadian Seed Growers' Association at Ottawa in February and the Convention of Manitoba Agricultural Associations at Winnipeg in February. At the Seed Growers' meeting I gave an address on 'The Distribution of Seed Produced at Experimental Farms,' and at the Manitoba Convention I delivered two addresses, one on 'The History of Marquis Wheat' and the other on 'Cereal Breeding.'

DISTRIBUTION OF SAMPLES OF SEED GRAIN AND POTATOES.

Some changes in the regulations and methods of the annual seed distribution have been found necessary, with a view to placing the seed as far as possible in the hands of those farmers who are likely to make the best use of it.

As great difficulty was experienced in finding potatoes suitable for distribution, not many of the applicants could be supplied this year. The number mentioned in the table includes only the samples sent out to Ontario and Quebec. The other provinces were supplied from the branch Experimental Farms.

Though the distribution is not quite finished at the time of writing this report the figures will be revised before the report is printed so as to include the whole of the distribution, which usually closes early in May.

The seed grain distributed this winter was grown at Indian Head, Sask., Brandon, Man., and Ottawa, Ont.

Owing to the scarcity of good material for distribution (especially potatoes and oats) and owing also to the enforcement of some necessary regulations to prevent waste of seed, the number of samples distributed is considerably less than last year.

Steps are being taken to ensure a larger supply of good seed for next year.

The following tables show the number of samples distributed:—

DISTRIBUTION—Classified by Varieties.

Name of Variety.	Number of Packages.	Name of Variety.	Number of Packages.
Oats—		Spring Wheat –	
Banner	1,374	Marquis	5,343
Improved Ligowo	145	Stanley	886
Thousand Dollar	98	Red Fife	327
Daubeney	42	Preston	280
		Huron	221
Total	1,659	White Fife	121
		Early Red Fife	19
		Bobs	6
Barley (six-row)—		Total	7,203
Manchurian	1,899		
Odessa	3	Peas—	
		Golden Vine	761
Barley (two-row)—		Arthur	562
Hannchen	42		
Canadian Thorpe	36	Total	1,323
Invincible	23		
		Potatoes—	
Total	2,003	Wee Macgregor	1,285

DISTRIBUTION—Classified by Provinces.

—	Prince Edward Island.	Nova Scotia.	New Brunswick.	Quebec.	Ontario.	Manitoba.	Saskatchewan.	Alberta.	British Columbia.	Total.
Oats	31	145	75	577	333	62	248	162	26	1,659
Barley	19	66	41	612	350	115	437	343	20	2,003
Wheat	36	173	119	1,058	275	655	2,976	1,877	34	7,203
Peas	7	98	72	666	156	37	167	91	29	1,323
Potatoes	.....	.....	.....	736	549	.....	.....	.....	.....	1,285
Total	93	482	307	3,649	1,663	869	3,828	2,473	109	13,473

TESTS OF THE VITALITY OF SEED GRAIN GROWN IN 1911 AT THE CENTRAL EXPERIMENTAL FARM, OTTAWA, AND AT THE BRANCH EXPERIMENTAL FARMS.

The following table, prepared by Mr. Wm. T. Ellis, gives the results of the germination tests of the seed grain produced at the various Experimental Farms in 1911:—

CENTRAL EXPERIMENTAL FARM, OTTAWA.

Kind of Seed.	Number of Tests.	Highest Per Cent.	Lowest Per Cent.	Average Per Cent. of Strong Growth.	Average Per Cent. of Weak Growth.	Average Total Vitality.
Wheat	177	100·0	50·0	82·1	4·8	87·0
Barley	114	100·0	53·0	81·6	7·0	88·6
Oats	65	100·0	69·0	91·8	2·4	94·2
Peas	42	100·0	66·0	....	...	89·0

CHARLOTTETOWN, PRINCE EDWARD ISLAND.

Wheat	21	98·0	71·0	88·0	2·3	90·3
Barley	26	100·0	91·0	95·2	2·2	97·5
Oats	31	100·0	87·0	94·6	2·0	96·6
Peas	13	1'0·0	52·0	....	...	86·7

NAPPAN, NOVA SCOTIA.

Wheat	11	92·0	51·0	77·6	3·4	81·0
Barley	17	92·0	88·0	91·8	2·3	94·1
Oats	15	98·0	85·0	84·9	4·7	89·6
Peas	12	92·0	66·0	....	...	77·1

CAP ROUGE, QUEBEC.

Wheat	11	99·0	84·0	89·5	4·0	93·6
Barley	13	99·0	68·0	82·9	9·9	92·8
Oats	12	100·0	93·0	96·6	1·2	97·9
Peas	10	100·0	74·0	....	...	93·2

BRANDON, MANITOBA.

Wheat	33	100·0	79·0	89·6	2·0	91·7
Barley	23	99·0	61·0	86·9	1·8	88·8
Oats	24	99·0	78·0	89·7	3·2	92·9
Peas	13	98·0	70·0	....	...	83·0

INDIAN HEAD, SASKATCHEWAN.

Wheat	54	98·0	65·0	86·8	2·6	89·4
Barley	36	100·0	72·0	92·3	1·7	94·0
Oats	31	100·0	14·0	77·7	5·7	83·4
Peas	16	96·0	62·0	....	...	82·5

ROSTHERN, SASKATCHEWAN.

Wheat	31	91·0	5·0	62·2	7·8	70·0
Barley	17	98·0	59·0	86·7	2·7	89·4
Oats	23	92·0	20·0	42·7	3·9	46·6
Peas	10	54·0	8·0	....	...	20·6

LACOMBE, ALBERTA.

Wheat	35	96·0	45·0	62·7	5·5	68·2
Barley	34	91·0	43·0	66·2	8·2	74·4
Oats	32	85·0	34·0	56·2	6·7	63·0

(Signed)

WILLIAM T. ELLIS.

MILLING AND BAKING TESTS.

These tests were confined almost exclusively this year to a study of a few of the most promising new cross-bred varieties of spring wheat which had not been previously tried for bread-making. Three or four of these new sorts gave flour in the highest class both for colour and strength.

Test of some of the early-maturing, cross-bred varieties grown at Indian Head last season were also made, with very satisfactory results so far as the relative standing of the new wheats compared with Red Fife is concerned.

It is proposed to publish the details of these tests at some later date.

SELECTION OF CEREALS.

The work of eliminating the less desirable varieties from among the large number of cross-bred sorts which are being grown at Ottawa is progressing as rapidly as circumstances permit. Great care has to be taken to guard against the rejection of any variety of special value. Those sorts which are of the highest promise are tested at one or more of the branch Farms as soon as a sufficient quantity of seed is available.

Last season eight new early-maturing varieties of spring wheat were sent to the Experimental Farms at Brandon and Indian Head in order to ascertain their fitness for cultivation in the provinces of Manitoba and Saskatchewan. The unfavourable season proved a severe test and showed that some of them are scarcely likely to be of use in those provinces. Three varieties, however, succeeded very well. One of these proved so successful that it has been named ('Prelude') and arrangements are being made to grow it for distribution next season.

PRELUDE WHEAT

Although Marquis wheat leaves little to be desired as a main crop variety for many sections in Central Canada, it is not early enough to fill the wants of all districts. The Dominion Cerealist intends, therefore, to introduce at least two new sorts, one ripening about a week earlier than Marquis (under average Saskatchewan conditions) and the other ripening about two weeks earlier than Marquis. There are ten or twenty very promising new cross-bred sorts now being studied with a view to selecting the best from among them to furnish the variety ripening one week ahead of Marquis. In the earliest group of all, the number of good varieties is much smaller. The best sort among those which have been sufficiently studied is now

being propagated for distribution. This new wheat has been named 'Prelude' since it ripens at the very beginning of the wheat harvest. Its previous designation was 135 B. Its descent may be traced as follows:

In the year 1888 a systematic and extensive series of experiments in the cross-breeding of wheats for the production of new varieties especially adapted to Canadian conditions was inaugurated by the Director of the Experimental Farms, Dr. Wm. Saunders. Some of the work in the fields was done by himself and some of it by his assistants. One of the crosses made by Dr. A. P. Saunders at that time was between Ladoga wheat and White Fife. From this cross arose the variety Alpha. In the year 1892 Alpha was crossed by Dr. A. P. Saunders with one of the wheats present in the commercial mixture known as Hard Red Calcutta. From this cross a variety was derived to which the name of Fraser was given. In 1903 the Dominion Cerealist crossed a very early ripening wheat from India (obtained under the name of Gehun) with Fraser. Prelude is one of the selections made from the progeny of this cross.

Prelude is an extremely early-ripening wheat producing short straw which stands up well. The heads are bearded, the awns being frequently of a dark colour. The chaff is yellowish and downy. The kernels are red, rather exceptionally hard, and of remarkable plumpness and high weight per bushel. The flour produced from this wheat is of the popular, granular type and of very high baking strength. In two series of baking trials, Prelude has surpassed Red Fife in strength, and in one season (see Report for 1910, page 168) it stood at the head of the list of all varieties tested. The colour of the flour is slightly darker than Red Fife or Marquis. Prelude has been grown for several years at Ottawa and for one season at Brandon and Indian Head. It gives a good yield but must not be expected to compete in this regard with Marquis or Red Fife under conditions which are favourable to these later sorts. It will certainly outyield the later varieties in localities which are subject to destructive early frosts.

During the two years in which Prelude has been grown in the regular test plots at Ottawa it has ripened in 92 and 82 days and has given crops at the rate of 2,010 and 1,740 lbs. per acre, an average of 1,875 lbs. or 31¼ bushels per acre. Last season at Brandon it matured in 94 days from seeding, and was cut on July 31. It gave a crop at the rate of 29 bushels 10 lbs. per acre. At Indian Head, last season, it required 113 days to mature, while Marquis required 131 and Red Fife 138 days. Prelude at Indian Head was cut on August 10, and gave a crop at the rate of 38 bushels 40 lbs per acre.

It is expected that a limited distribution of Prelude wheat will be possible next winter. It will be sent to those localities for which a very early-maturing variety is required. Farmers in districts for which Marquis or Red Fife is suitable must not expect to receive this new variety until the needs of less favoured localities have been met.

MARQUIS WHEAT.

A few details in regard to the origin and characteristics of Marquis wheat were given in the report of the Experimental Farms for the year 1906. It seems necessary, now, to treat this subject at somewhat greater length in view of the exceptional interest which has lately been aroused in this wheat.

Among the crosses made by the Director of Experimental Farms and his assistants during the first few years after the Farms were established, several were effected between Red Fife and various early-maturing wheats from Europe and Asia. All the details in regard to the origin of Marquis are not available, but it is one of the descendants of a cross between an early-ripening Indian wheat, Hard Red Calcutta (as female) and Red Fife (as male). The cross (as appears from unpublished notes) was made by Dr. A. P. Saunders, probably at the Experimental Farm at Agassiz, in the year 1892. The cross-bred seeds, or their progeny, were transferred to Ottawa and

writer of this report was appointed in 1903 to take charge of the work of cereal breeding, he made a series of selections from the progeny of all the cross-bred wheats which had been produced at Ottawa up to that time. Some of these had been named and others were under numbers. Though they had all been subjected to a certain amount of selection, each of them consisted of a mixture of related types. In some cases all the types present were similar. In other instances striking differences were observed. The grain which had descended from the cross referred to above was found by careful study of individual plants (especially by applying the chewing test to ascertain the gluten strength and probable bread-making value) to be a mixture of similar-looking varieties which differed radically in regard to gluten quality. One of the varieties isolated from this mixture was subsequently named Marquis. Its high bread-making strength and colour of flour were demonstrated in the tests made at Ottawa in the early months of 1907, and all the surplus seed was at once sent to the Indian Head Experimental Farm for propagation.

It will be clearly seen from the above account that the question, 'When was Marquis wheat originated?' can never be answered. It came into existence probably at Ottawa between the years 1895 and 1902. It remained, however, mixed with other related sorts until discovered by the writer in 1903. It was first grown in a pure state in 1904, when a few seeds were sown in a sheltered garden on the Central Experimental Farm. Even then, however, its fine qualities were only partly known, and it was not until the cerealist's baking tests of 1907 were completed that he decided to send out this wheat for trial in Saskatchewan. Its success in the prairie country was phenomenal. The year 1907 was quite unfavourable for most varieties owing to the prevalence of rust and of cool, wet weather. The early-ripening habit of Marquis and its power of resisting rust (to a certain extent) gave it an immense advantage. The result was that it headed the list of varieties in plots and fields alike. It yielded at the rate of 32 bushels per acre in the plots while Red Fife gave 12 bushels. In the fields it yielded at the rate of 42 bushels per acre and stood far ahead of any other sort.

Taking the average of the past five years (1907-1911 inclusive) Marquis has given 50 per cent more crop than Red Fife, on the uniform trial plots at Indian Head.

At Brandon in a test for four years (1908-1911 inclusive) Marquis has yielded 10 per cent more than Red Fife.

In addition to its productiveness, the chief points in favour of Marquis, for the provinces of Saskatchewan, Manitoba and Alberta, are its earliness in ripening (generally from 6 to 10 days earlier than Red Fife), strength of straw and comparative freedom from rust, heavy weight per bushel and fine appearance of the grain, and the excellent colour and baking strength of the flour produced from it.

The best field crops of Marquis wheat have exceeded the plot records at both Brandon and Indian Head. In 1909 a field of 4⅓ acres at Brandon gave 52¼ bushels per acre. In 1910 a field of 5⅓ acres at Indian Head gave a little over 53 bushels per acre.

But the previous records were surpassed at Rosthern last season when a ⅒-acre plot of Marquis wheat at the Experimental Station yielded at the rate of 70 bushels per acre, and when Mr. Seager Wheeler obtained (from 5 lbs. of seed produced at Ottawa the previous year), 250 lbs. of wheat and two sheaves not threshed but estimated to contain at least 5 lbs. of grain each. This extraordinary yield was obtained on a strip of land measuring 15 x 155 ft. equal to about 1/19 of an acre. This constitutes probably a world's record for spring wheat. The crop from this plot furnished part of the seed with which Mr. Wheeler gained the highest award for spring wheat at the New York Land Show last autumn.

Marquis wheat is recommended as the best variety of wheat now available for Saskatchewan, for many parts of Alberta and for Manitoba, except in the southern portion where the superiority of Marquis over Red Fife has not yet been demonstrated.

For the eastern provinces and for British Columbia, Marquis has not proved specially productive or valuable.

In the report of last year, Early Red Fife was mentioned as a variety much like Marquis in most respects and a rival to the latter sort. It was stated, however, that Early Red Fife appears to be more subject to rust than Marquis. Further experience under the unfavourable conditions of last season proves this to be correct. Early Red Fife is, therefore, not recommended for general use throughout the prairie provinces. It has done well, however, in some of the drier districts where rust is less prevalent. In the eastern provinces, Early Red Fife has a record as good as, or better than, Marquis.

EXPERIMENTS WITH CEREALS, ETC., ON THE CENTRAL EXPERIMENTAL FARM, OTTAWA.

The remainder of this report gives the results of the field work at Ottawa in the season of 1911, and the conclusions drawn from several years' trials as to the best varieties for cultivation in those parts of Ontario and Quebec, the climate of which is similar to that of Ottawa. All the work here reported upon is carried out under the immediate supervision of the Dominion Cerealist.

WEATHER.

The spring of 1911 opened rather later than usual, and the sowing of the plots could not be commenced until April 28. It was, therefore, impossible to complete the seeding in good time, and those plots which were sown towards the last could not have been expected to give very good results, except in an unusually favourable season. Unfortunately, however, extremely hot weather set in almost immediately after the seeding was finished, thus making the conditions particularly trying for cereals.

The summer on the whole was characterized by exceptionally high temperatures and scanty rainfall. The extreme heat during the first week of July caused damage which was particularly noticeable in the peas. The continuous heat during the month hastened the ripening of all grain crops, so that the harvest was about as early as in 1910, although the time of sowing was later.

SMALL PLOTS OF CEREALS, ETC.

In addition to the numerous small plots of grain of cross-bred origin which are not yet fixed in character, there were grown at Ottawa last year in plots of less than one-sixtieth of an acre:—

75 new cross-bred varieties of spring wheat.
4 selected strains from named varieties of spring wheat.
14 new cross-bred varieties of oats.
4 selected strains from named varieties of oats.
29 new cross-bred varieties of barley.
24 selected strains from named varieties of barley.
17 new cross-bred varieties of peas.
3 selected strains from named varieties of flax.
15 new cross-bred varieties of beans.

The total was 150 new cross-bred varieties and 35 selected strains.

UNIFORM TEST PLOTS OF CEREALS, ETC.

The regular test plots of grain at Ottawa are one-sixtieth of an acre each, and those of field roots are one-hundredth of an acre.

The number of these test plots during the past season was as follows: Spring wheat 147, winter wheat 20, emmer and spelt 21, oats 55, six-row barley 72, two-row barley 40, peas 43, spring rye 3, winter rye 2, field beans 7, flax 19, turnips (Swedes) 10, mangels 8, carrots 5, sugar beets 3, Indian corn 34, making a total of 489 plots and representing about 450 varieties and selected strains.

SPRING WHEAT.

The regular test plots of spring wheat were sown on April 28 to May 4, the seed being used at the rate of about one and one-half bushels to the acre. The durum varieties are included in the table with the ordinary sorts of spring wheat, so that the relative yields of the different kinds may be more readily seen. The durum wheats were sown at the rate of about one and three-quarter bushels per acre.

The following table includes only the most important plots. The varieties mentioned without names are new cross-bred sorts, produced by the Dominion Cerealist, which are not yet ready for distribution. Those varieties which have a letter after the name are new strains propagated from single selected plants.

The yield per acre is expressed in pounds and also in 'bushels' of sixty pounds.

The character of the straw is indicated by marks on a scale of ten points, according to the proportion of the plot standing erect at harvest time.

*Named varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

SPRING WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average length of Straw including Head.	Strength of straw on a scale of 10 Points.	Average length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inches		Inches.	Lbs.	Bu. Lbs.	Lbs.
1	363 D	May 4	July 28	85	48	9	3½	2,520	42 ..	60·5
2	522 A	"	" 31	83	48	9	3¼	2,310	38 30	61
3	Early Russians*	April 28	Aug. 5	99	48	5	4	2,190	36 30	63·5
4	522 B	May 4	July 31	88	50	8	3¼	2,190	36 30	60·5
5	84 B 1	April 29	" 28	90	48	9	3	2,160	36 ..	61
6	96 B	" 29	Aug. 3	96	46	4	3¼	2,160	36 ..	63·2
7	Bishop*	" 28	July 28	91	48	8	3⅝	2,130	35 30	61·2
8	Yellow Cross*	" 29	" 31	93	48	7	3¼	2,100	35 ..	64
9	83 J	" 29	" 31	93	46	8	3½	2,100	35 ..	58·5
10	521 B	May 4	" 31	88	45	7	3½	2,100	35 ..	61
11	Preston H*	April 28	" 31	94	50	9	3¾	2,070	34 30	60·5
12	9 G. Beardless	" 29	Aug. 3	96	50	10	3½	2,070	34 30	58·2
13	Red Fife H*	" 28	" 8	102	46	10	3½	2,040	34 ..	60·5
14	177 A	" 29	July 26	88	48	0	3	2,040	34 ..	58·5
15	Red Fern C*	" 28	Aug. 3	97	48	10	4	2,010	33 30	63
16	75 A	" 29	July 28	90	50	9	3¼	2,010	33 30	63
17	82 C 2	" 29	" 31	93	48	8	3½	2,010	33 30	61·4
18	86 B	" 29	" 27	89	48	8	3	2,010	33 30	62
19	86 D 2	" 29	" 31	93	51	7	3¼	2,010	33 30	61
20	106 B	" 29	" 30	92	46	8	3	2,010	33 30	62·2
21	Prospect*	" 28	" 27	90	48	9	3⅕	1,980	33 ..	59·5
22	74 A	" 29	" 27	89	46	6	2¾	1,980	33 ..	61·2
23	82 B 1	" 29	" 28	90	48	10	3½	1,980	33 ..	61·5
24	178 B	" 29	" 30	93	50	0	3½	1,980	33 ..	61·8
25	415 C	May 4	Aug. 5	93	50	10	4¼	1,980	33 ..	58·5
26	422 B	" 4	" 5	92	50	9	4	1,980	33 ..	57·2
27	Kubanka A*	April 28	" 6	100	56	6	2½	1,950	32 30	64
28	Red Fern B*	" 28	" 3	97	48	10	4	1,950	32 30	62·5
29	83 E	" 29	July 31	93	46	9	3¼	1,950	32 30	59·4
30	197 C	May 2	" 29	88	48	7	3¼	1,950	32 30	59
31	524 B	" 4	" 26	83	46	10	3¼	1,950	32 30	59·5
32	Aurora*	April 28	" 19	82	42	10	3	1,920	32 ..	59
33	82 B 2	" 29	" 31	93	50	7	3½	1,920	32 ..	60
34	128 B	" 29	" 28	90	48	3	3¼	1,920	32 ..	61·5
35	227 C	May 2	" 24	83	45	8	2¾	1,920	32 ..	60
36	353 A 2	" 4	" 27	84	50	10	3	1,920	32 .	61
37	Pringle's Champlain C*	April 28	Aug. 1	95	48	8	4	1,890	31 30	61·5
38	74 B	" 29	" 3	96	45	10	3	1,890	31 30	59
39	489 A	May 4	July 28	85	48	8	3½	1,890	31 30	60
40	129 D	April 29	" 30	92	48	7	3¼	1,860	31 ..	62·4
41	362 C 3	May 4	Aug. 4	92	44	10	3	1,860	31 ..	57·2
42	363 E 1	" 4	July 30	87	46	4	3¼	1,860	31 ..	60
43	192 A	April 29	" 28	90	48	0	3¼	1,830	30 30	61·5
44	199 B	May 2	" 29	88	50	8	3	1,830	30 30	61·2
45	White Russian D*	April 29	Aug. 9	102	52	5	5	1,800	30 ..	59
46	84 A	" 29	July 23	90	48	4	3	1,800	30 ..	63·2
47	128 C	" 29	" 24	86	44	9	3	1,800	30 ..	62·2
48	182 E	" 29	" 23	90	47	7	2⅘	1,800	30 ..	62·2
49	523 D	May 4	" 31	88	47	6	3½	1,800	30 ..	61·8
50	Kubanka B*	April 28	Aug. 6	100	56	6	2½	1,770	29 30	64
51	Outlook*	" 28	" 5	99	48	10	4	1,770	29 30	60·8
52	55 A	" 29	July 22	84	48	10	3¼	1,770	29 30	59
53	363 C	May 4	" 31	88	45	7	3¼	1,770	29 30	60·5
54	520 A	" 4	" 31	88	46	8	3¼	1,770	29 30	62
55	White Russian C*	April 29	Aug. 9	102	52	9	5	1,740	29 ..	60·2
56	123 B	" 29	July 23	85	48	6	2½	1,740	29 ..	61·5
57	135 B. (Prelude)	" 29	" 20	82	42	10	2	1,740	29 ..	63
58	146 A	" 29	Aug. 3	96	50	6	3¼	1,740	29 ..	56·5
59	195 F	May 2	July 31	90	45	2	3¼	1,740	29 ..	61·2
60	234 B	" 2	" 31	90	50	9	3½	1,740	29 ..	61
61	236 B	" 2	Aug. 3	93	48	10	4	1,740	29 ..	59
62	Huron selected*	April 28	" 2	96	42	10	3¾	1,710	28 30	62
63	137 A	" 29	July 30	92	50	2	4	1,710	28 30	57·2
64	201 D	May 2	" 29	88	44	3	3	1,710	28 30	57·2
65	351 A	" 4	" 28	85	46	9	3¼	1,710	28 30	59·8

SPRING WHEAT—Test of Varieties—*Continued.*

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average length of Straw including Head.	Strength of straw on a scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Inch.		Inches.	Lbs.	Bu. Lbs	Lbs.
66	364 C	May 4	Aug. 1	89	46	3	3¾	1,710	28 30	56·5
67	Chelsea*	April 28	" 2	96	44	9	3¾	1,680	28 ..	61·2
68	354 C	May 4	July 30	87	44	0	3½	1,680	28 ..	59
69	507 B	" 4	" 31	88	45	4	3¼	1,680	28 ..	55
70	Goose	April 28	Aug. 7	101	52	5	2½	1,650	27 30	63·2
71	Red Fife M*	" 28	" 8	102	46	10	3½	1,650	27 30	60·8
72	43 H	" 28	" 2	96	42	10	1¾	1,650	27 30	58
73	129 A	" 29	July 23	85	42	10	3	1,650	27 30	61·2
74	Kubanka C*	" 28	Aug. 6	109	56	6	2½	1,620	27 ..	64
75	109 B	" 29	July 29	91	46	8	3	1,620	27 ..	62·2
76	113 B	" 29	" 23	85	46	8	2¾	1,620	27 ..	62·5
77	168 B	" 29	Aug. 8	101	52	7	4½	1,620	27 ..	61·2
78	346 C	May 4	" 1	89	46	5	3½	1,620	27 ..	60·5
79	410 B	" 4	July 29	86	48	5	3½	1,620	27 ..	56·8
80	427 B	" 4	Aug. 1	89	48	10	4	1,620	27 ..	62·2
81	446 C	" 4	" 7	95	46	10	3½	1,620	27 ..	63
82	Onega*	April 28	July 21	84	44	10	2¾	1,590	26 30	53
83	513 A	May 4	" 28	85	48	1	3½	1,590	26 30	56
84	192 B 2	" 2	" 30	89	48	1	3½	1,560	26 ..	59·2
85	Roumanian	April 28	Aug. 8	102	52	8	2½	1,530	25 30	65·4
86	444 D	May 4	July 24	81	44	5	3	1,530	25 30	62·4
87	73 A	April 29	" 31	93	42	10	3¼	1,500	25 ..	55·5
88	445 B	May 4	" 28	85	46	3	3¼	1,500	25 ..	61·8
89	507 A	" 4	Aug. 5	93	46	2	4	1,500	25 ..	58
90	Hungarian White B*	April 28	" 1	95	48	10	4	1,470	24 30	61
91	Stanley A*	" 29	" 5	98	48	10	3¾	1,470	24 30	59·5
92	341 A	May 4	July 27	84	46	6	3	1,470	24 30	61
93	372 A	" 4	Aug. 7	95	50	10	4½	1,470	24 30	58
94	397 D	" 4	July 30	87	46	3	3	1,470	24 30	58·5
95	Hungarian White D*	April 28	Aug. 1	95	48	9	4	1,440	24 ..	61·4
96	87 A 1	" 29	" 2	95	52	5	3½	1,440	24 ..	60
97	87 B 1	" 29	" 1	94	46	8	3	1,440	24 ..	62
98	222 B	May 2	July 26	85	48	5	3	1,440	24 .	59·5
99	265 B	" 2	Aug. 4	94	50	10	4	1,440	24 ..	60·5
100	362 A	" 4	" 7	95	50	10	4	1,440	24 ..	60·2
101	Downy Riga*	April 28	July 22	85	48	10	2¾	1,410	23 30	61
102	Marquis*	" 28	" 31	94	46	10	3¼	1,410	23 30	62·8
103	6 F 2	" 29	Aug. 7	100	46	4	6½	1,380	23 ..	61·4
104	378 A	May 4	" 5	93	48	10	4	1,380	23 ..	57·2
105	431 B	" 4	July 30	87	48	10	3½	1,380	23 ..	61
106	446 A	" 4	Aug. 1	89	48	5	3¾	1,380	23 ..	57·5
107	492 A	" 4	July 28	85	48	5	3½	1,380	23 ..	58·5
108	495 B	" 4	" 28	85	46	7	3	1,350	22 30	60·8
109	Alpha Selected*	April 28	" 31	94	48	10	3½	1,320	22 ..	57·5
110	48 A	" 29	Aug. 1	94	46	10	3½	1,320	22 ..	58·5
111	402 F	May 4	July 28	85	50	4	3½	1,320	22 ..	61
112	438 B	" 4	" 28	85	45	10	3¼	1,320	22 ..	60·5
113	7 J 4	April 29	Aug. 2	95	52	10	4½	1,290	21 30	59·5
114	444 A	May 4	July 27	84	46	6	3	1,290	21 30	61
115	107 A	April 29	" 27	89	48	5	3	1,230	20 30	59
116	523 A 2	May 4	" 24	81	44	9	3¼	1,230	20 30	62
117	White Fife C*	April 29	Aug. 9	102	44	10	3¼	1,200	20 ..	60·5
118	Early Red Fife*	" 28	" 6	100	48	10	3¾	1,170	19 30	62
119	Red Fife (Indian Head seed)	" 28	" 8	102	46	10	3½	1,170	19 30	60·2
120	Yellow Queen*	" 29	July 31	93	50	7	3	1,170	19 30	61
121	442 A	May 4	" 26	83	44	10	3	1,170	19 30	60·5
122	98 A	April 29	" 30	92	48	0	3¾	1,110	18 30	55
123	446 H	May 4	Aug. 5	93	50	6	3¾	1,110	18 30	60·5
124	258 A	" 2	" 3	93	44	7	3¾	1,080	18 ..	59·4
125	334 C	" 4	July 30	87	46	10	4	1,050	17 30	61·2
126	Reliable	April 29	Aug. 7	100	46	10	3½	990	16 30	58·5
127	319 B	May 4	July 23	80	46	10	3	990	16 30	60·5
128	Bobs	April 28	" 31	94	44	10	3½	870	14 30	61·5
129	495 A	May 4	" 28	85	48	8	3½	660	11 ..	57·5
130	43 B	April 29	Aug. 14	107	50	7	3½	570	9 30	58·8

The average yield of the 130 plots was 1,657 lbs. (27 bushels 37 lbs.) per acre

MOST PRODUCTIVE VARIETIES OF SPRING WHEAT AT OTTAWA.

Among the ordinary sorts of spring wheat, the following varieties have shown unusual productiveness for a series of years at Ottawa: Preston, Huron, Pringle's Champlain and Bishop. The first three are hard, red wheats with bearded heads. Bishop is a beardless, early, white wheat, not usually soft in character. These four varieties are good for flour production though the flour is not in the first rank for strength and colour.

Somewhat lower in yield but superior in the strength of their flour are Red Fife, Marquis and White Fife, all beardless.

The durum wheats, which, owing to their peculiar character and their unpopularity with millers, should only be grown for special purposes, give good yields at Ottawa, but are particularly productive in rather dry climates, where they usually produce larger crops than the ordinary types of spring wheat.

EARLY VARIETIES OF SPRING WHEAT.

For Ontario and the eastern provinces and for British Columbia, Huron and Preston are recommended as very satisfactory early-maturing varieties. Marquis is also good.

For the central provinces (Manitoba, Saskatchewan and Alberta) Marquis is recommended.

When extreme earliness is required the above sorts may be found unsuitable. the new cross-bred variety Prelude is being introduced to meet the demands for a wheat of excellent character and extreme earliness.

WINTER WHEAT.

The plots of winter wheat were sown on August 29, 1910, the seed being used at the rate of about one and three-quarter bushels to the acre. The soil selected for these plots was of a light and rather sandy character as it is found necessary, in the climate of Ottawa, to sow winter wheat only on land where water cannot lie in spring or during any thaw in the winter months. The wheat made good growth in the autumn, stood the winter well, and gave a large yield.

The yield per acre is expressed in pounds and also in 'bushels' of sixty pounds.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average length of Straw including head.	Strength of straw on a scale of 10 points.	Average length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning
					Inches.		In.	Lbs.	Bush. Lbs.	Lbs.
1	American Banner.....	Aug. 29	July 17	322	55	6	3½	3,210	53 30	60 8
2	Dawson's Golden Chaff...	" 29	" 19	324	58	8	4	3,060	51 ..	61
3	Buda Pesth.....	" 29	" 15	320	57	5	3¼	2,820	47 ..	61
4	Imperial Amber.....	" 29	" 19	324	58	7	4½	2,820	47 ..	60·5
5	Jones' Winter Fife.....	" 29	" 17	322	58	5	4	2,760	46 ..	62·5
6	Egyptian Amber.....	" 29	" 19	324	58	6	3¾	2,550	42 30	62
7	Red Velvet Chaff.....	" 29	" 19	324	57	10	4	2,220	37 ..	62·2
8	Tasmania Red	" 29	" 20	325	60	8	4	2,130	35 30	61.5
9	Turkey Red No. 380.....	" 29	" 21	326	50	4	3	1,830	30 30	62

The average yield of the 9 plots was 2,600 lbs. (43 bushels 20 lbs.) per acre.

RECOMMENDED VARIETIES OF WINTER WHEAT.

The climate of Ottawa being too severe for the regular production of good crops of winter wheat, the average yields obtained here would scarcely serve as a satisfactory guide for farmers in southern Ontario. Some recommendations in regard to varieties of winter wheat may, however, be given.

One of the best varieties in the field is Dawson's Golden Chaff (beardless). It has the disadvantage, however, of giving flour which is low in baking strength and therefore suitable for crackers, cakes, etc., but not for light bread. The gluten content of this variety is not high enough to make it quite satisfactory for the production of rolled wheat and other similar cereal products, though it is used for these purposes.

Turkey Red (bearded) yields the strongest flour, but does not as a rule give, in Ontario, as large a yield of grain per acre as some of the other sorts.

Egyptian Amber (bearded) and Tasmania Red (bearded) give good yields of grain and produce very good flour for bread making.

Imperial Amber (bearded) is another variety which can also be recommended both for its high yield and the very fair strength of its flour.

EMMER AND SPELT.

The plots of Emmer and Spelt were sown on April 28, the seed being used at the rate of about one hundred and twenty pounds (or four bushels by measure) to the acre.

Common Emmer (often incorrectly called 'Speltz') is one of the best varieties, being less coarse and containing a larger proportion of kernel than most of the other sorts.

The varieties without names are new cross-bred sorts produced by the Dominion Cerealist.

EMMER AND SPELT—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of straw including head.	Strength of straw on a scale of 10 points.	Average Length of Head	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					Ins.		Ins.	Lbs.	Lbs.
1	44 G	April 28	July 25.	88	45	9	2¼	2,700	41
2	Double Emmer	" 28	Aug. 1.	95	36	2	2	2,160	34
3	44 H	" 28	July 25.	88	44	8	2¼	2,160	37·5
4	45 E	" 28	" 25.	88	44	10	2¼	2,130	34·5
5	9 K 2	" 28	Aug. 2.	96	36	2	2	2,010	31·2
6	43 E	" 28	" 2.	96	47	3	2	2,010	29·5
7	Common Emmer	" 28	" 3.	97	38	5	2	1,920	36
8	Red Emmer	" 28	" 9.	103	48	8	3½	1,920	35
9	46 G	" 28	July 31.	94	40	10	2	1,890	41
10	46 D	" 28	" 26.	89	42	10	2¼	1,860	41
11	43 F	" 28	Aug. 5.	99	40	6	2¾	1,680	33·8
12	55 C	" 28	July 25.	88	42	5	1¾	1,650	35·5
13	44 D	" 28	Aug. 1.	95	44	3	2	1,620	36·8
14	45 G	" 28	" 1.	95	45	8	2¼	1,500	40·5
15	55 E	" 28	July 28.	91	46	10	2½	1,500	33·2
16	Red Spelt	" 28	Aug. 10.	104	48	9	4¾	1,440	27
17	Smooth Spelt	" 28	" 10.	104	48	10	5¼	1,320	25
18	44 A	" 28	" 2.	96	42	2	2½	1,320	30
19	White Spelt	" 28	" 10.	104	48	8	5½	1,290	27

The average yield of the nineteen plots was 1,794 lbs. per acre.

OATS.

The varieties under numbers are new cross-bred kinds produced at Ottawa. All of them have the Chinese Naked oat as one parent and have inherited from that variety the peculiarity of threshing out free from hull.

The name of the selected strain obtained from Sixty Day (which has been designated as Sixty Day White in previous reports) has been changed to Eighty Day: a name which is not misleading as to the early maturing character of this oat at Ottawa.

The oat plots were sown on May 12 the seed being used at the rate of about two bushels per acre for most varieties, but in greater quantities whenever the oats were of unusually large size.

The yield per acre is expressed in pounds and also in 'bushels' of thirty-four pounds.

*Named varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

OATS.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning
					In.		In.	Lbs.	Bush. Lbs.	Lbs.
1	Banner L*	May 12	Aug. 8	88	50	8	9	2,730	82 2	31
2	Banner K*	" 12	" 8	88	50	9	9	2,700	79 14	32·5
3	Victory	" 12	" 8	88	41	10	8½	2,700	79 14	37·5
4	Improved American	" 12	" 8	88	44	10	8	2,670	78 18	33·5
5	Banner B*	" 12	" 7	87	50	9	8	2,640	77 22	32
6	Irish Victor	" 12	" 8	88	46	9	8¾	2,580	75 30	34·5
7	Banner J*	" 12	" 8	88	50	9	9	2,520	74 4	31·2
8	Banner M*	" 12	" 8	88	50	10	9	2,490	73 8	30
9	Abundance D*	" 12	" 9	89	46	9	9	2,430	71 16	34 4
10	Daubeney Selected*	" 12	July 27	76	38	10	6	2,400	70 20	33·5
11	Danish Island	" 12	Aug. 7	87	45	10	9	2,370	69 24	34
12	Gold Rain	" 12	" 5	85	38	10	7½	2,370	69 24	37·8
13	American Beauty C*	" 12	" 9	89	51	4	8	2,340	68 28	33·5
14	Swedish Black	" 12	July 28	77	44	7	9½	2,340	68 28	33·4
15	Twentieth Century	" 12	Aug. 5	85	42	10	8	2,340	68 28	35·5
16	Green Mountain	" 12	" 9	89	42	10	9	2,310	67 32	35·2
17	Thousand Dollar	" 12	" 5	85	44	10	8	2,280	67 2	36
18	Eighty Day*	" 12	July 23	72	40	9	6¼	2,250	66 6	30·5
19	478 D	" 12	Aug. 8	88	45	10	10	2,250	66 6	33·3
20	Siberian	" 12	" 8	88	42	10	8	2,220	65 10	33·8
21	Swedish Select	" 12	" 5	85	42	9	8	2,220	65 10	36
22	American Beauty B*	" 12	" 9	89	51	3	8	2,160	63 18	33
23	Abundance A*	" 12	" 9	89	44	7	9	2,130	62 22	32·5
24	Black Mesdag	" 12	July 27	76	42	9	8	2,100	61 26	33·5
25	Ligowo Swedish	" 12	Aug. 2	82	40	8	7	2,100	61 26	34·5
26	Abundance, Garton's Regenerated	" 12	" 8	88	46	5	9	2,070	60 30	35·3
27	Early Ripe F*	" 12	July 27	76	38	10	6	1,890	55 20	28
28	Early Ripe G*	" 12	" 27	76	38	10	6	1,860	54 24	30·5
29	Alpine	" 12	Aug. 7	87	51	3	8½	1,830	53 28	31·5
30	477 T	" 12	" 8	88	38	10	7½	1,770	52 1	47·2
31	Bergs	" 12	" 9	89	46	9	8	1,710	50 10	31·5
32	Early Ripe E*	" 12	July 27	76	38	9	6	1,680	49 14	31
33	477 G	" 12	Aug. 2	82	37	10	8½	1,650	48 18	47·8
34	477 X	" 12	" 9	89	42	10	6¾	1,590	46 26	49·5
35	480 L	" 12	" 5	83	40	10	7¾	1,560	45 30	49
36	Pioneer	" 12	" 5	85	36	10	7¾	1,500	44 4	33·5
37	Tartar King	" 12	" 5	85	40	10	8	1,500	44 4	27·5
38	477 E	" 12	" 2	82	37	10	8½	1,500	44 4	45
39	477 Q	" 12	" 12	92	44	10	7	1,410	41 16	45
40	Early Blonde	" 12	" 16	96	40	8	7½	1,380	40 20	27·5
41	Excelsior	" 12	" 8	88	36	10	7½	1,350	39 24	31·5
42	477 D	" 12	" 8	88	36	10	7	1,290	37 32	43
43	479 A	" 12	" 7	87	40	10	8¼	1,230	36 6	48
44	479 L	" 12	" 7	87	36	10	7½	1,110	32 22	44·5
45	479 N	" 12	" 10	90	44	10	7¾	1,110	32 22	45·8
46	480 J	" 12	" 1	81	38	10	7½	1,080	31 26	47
47	479 M	" 12	" 5	85	38	10	7	1,020	30 ..	50·2
48	479 Q	" 12	" 7	87	42	10	9	900	26 16	47·5
49	477 H	" 12	" 16	96	42	10	8	870	25 20	44 5
50	479 B	" 12	" 10	90	42	10	7¾	780	22 32	43·2
51	480 A	" 12	" 8	88	40	10	7	780	22 32	49
52	479 P	" 12	" 2	82	36	10	7½	570	16 26	45·5
53	479 D	" 12	" 2	82	38	10	7½	510	15 ..	49

The average yield of the 53 plots was 1,834 lbs. (53 bushels 33 lbs.) per acre.

MOST PRODUCTIVE VARIETIES OF OATS.

Among the most productive kinds of oats, the following white varieties deserve special mention: Thousand Dollar, Twentieth Century, Improved American, Banner, Garton's Abundance and Danish Island. One or more of these kinds can be obtained from any good seedsmen. Gold Rain is a very productive yellow oat. Among black oats, the English varieties, Pioneer and Excelsior, have given the best returns on the Central Farm during the past few years, but they have not proved so productive as the best white kinds.

EARLIEST VARIETIES OF OATS.

The varieties called Eighty Day and Early Ripe are extremely early in ripening, but cannot be recommended for general purposes, though they may be useful in certain special cases. Sixty Day and Orloff are commercial kinds resembling Eighty Day. The name Sixty Day is misleading. Somewhat less early, but probably more satisfactory as a rule, are Daubeney and Tartar King. These oats are obtainable in commerce, but farmers will usually find some of the later varieties more productive.

SIX-ROW BARLEY.

The plots were sown on May 9, the seed being used at the rate of about two bushels to the acre. The land on which it was necessary to place the plots varied somewhat in character, so that the yields given in the following table are not very trustworthy.

The excessively hot weather seriously affected the yield and quality of the barley crop.

The yield per acre is expressed in pounds, and also in 'bushels' of forty-eight pounds.

The varieties under numbers are new cross-bred sorts produced by the Dominion Cerealist. Many of them are hulless, as may be seen from their high weight per bushel.

*Named varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

Six-Row Barley—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning
					In.		In.	Lbs.	Bush. Lbs.	Lbs.
1	Albert*	May 9	July 27	79	40	10	3¼	2,880	60 ..	46
2	Stella G.*	" 9	" 26	78	42	9	3¼	2,760	57 24	46
3	Odessa D.*	" 9	" 28	80	35	9	3¾	2,730	56 42	43·2
4	Manchurian G.*	" 9	" 27	79	40	10	3½	2,610	55 ..	45·2
5	Manchurian H.*	" 9	" 27	79	40	10	3½	2,580	53 36	46·2
6	Taganrog*	" 9	" 24	76	36	8	3	2,580	53 36	44·2
7	Manchurian A.*	" 9	" 27	79	40	10	3½	2,550	53 6	46
8	Oderbruch	" 9	" 28	80	38	10	3½	2,550	53 6	45·5
9	O. A. C. No. 21	" 9	" 27	79	42	10	3½	2,520	52 24	45·2
10	Nugent*	" 9	" 27	79	40	10	3¾	2,490	51 42	45·4
11	Black Japan	" 9	" 25	77	33	10	2½	2,460	51 12	45
12	Odessa F.*	" 9	" 28	80	38	9	3¾	2,460	51 12	46
13	Odessa C.*	" 9	" 28	80	35	10	3¾	2,340	48 36	45·2
14	Escourgeon	" 9	" 28	80	37	10	3½	2,310	48 6	47
15	Stella C.*	" 9	" 26	78	42	9	3½	2,310	48 6	45·4
16	Success B.*	" 9	" 20	72	40	10	3	2,280	47 24	44·5
17	582 E	" 9	" 31	83	38	10	3	2,280	47 24	40
18	Stella A.*	" 9	" 26	78	42	10	3½	2,190	45 30	46·2
19	475A	" 9	Aug. 1	84	30	10	3¼	2,190	45 30	45
20	460A	" 9	July 23	75	30	9	1¾	2,160	45 ..	58·5
21	Blue Short Head A*	" 9	Aug. 2	85	28	10	2¼	2,100	43 36	44·5
22	465 C	" 9	July 24	76	32	10	2	1,980	41 12	62
23	475 L	" 9	" 20	72	26	10	2	1,980	41 12	46
24	560 H	" 9	" 24	76	40	9	3¼	1,950	40 30	40
25	466 A	" 9	" 24	76	30	8	2½	1,920	40 ..	56·8
26	475 K 2	" 9	" 20	72	30	10	2	1,920	40 ..	42
27	466 E	" 9	" 29	81	30	10	3	1,860	38 36	55
28	Blue Short Head C*	" 9	Aug. 2	85	28	10	2¼	1,830	38 6	44
29	563 B 1	" 9	July 27	79	33	10	3	1,830	38 6	57·4
30	463 A	" 9	" 27	79	36	5	2	1,800	37 24	47
31	466 C	" 9	" 24	76	34	10	3	1,800	37 24	58
32	472 A	" 9	" 22	74	30	9	2¼	1,800	37 24	59·8
33	557 D	" 9	" 24	76	36	10	3	1,800	37 24	40·4
34	462 C	" 9	" 28	80	40	8	2¾	1,770	36 42	58·8
35	565 A	" 9	" 28	80	38	10	3¾	1,770	36 42	46·5
36	563 A 1	" 9	" 28	80	32	10	3¾	1,770	36 42	55·2
37	471 D 3	" 9	" 22	74	28	10	2¼	1,740	36 12	60
38	574 B	" 9	" 28	80	30	10	2½	1,740	36 12	58·2
39	564 C	" 9	" 27	79	30	10	3	1,680	35 ..	45
40	Early Indian*	" 9	" 15	67	30	4	2	1,620	33 36	42
41	467B	" 9	" 24	76	36	10	3	1,590	33 6	57·2
42	459B	" 9	" 27	79	35	9	2¾	1,500	31 12	58·5
43	461A	" 9	Aug. 3	86	36	10	2½	1,500	31 12	61
44	465A 2	" 9	July 27	79	35	8	2¾	1,500	31 12	60·8
45	467C	" 9	" 27	79	30	10	2¾	1,470	30 30	51·5
46	462D	" 9	" 28	80	36	7	2½	1,410	29 18	57·2
47	475C	" 9	Aug. 10	93	28	10	3	1,380	28 36	46
48	458B	" 9	July 22	74	38	10	3	1,380	28 36	46·2
49	475B	" 9	" 24	76	24	10	2¼	1,290	26 42	43·2
50	Triumph	" 9	Aug. 2	85	32	8	3¼	1,260	26 12	42·2
51	471 C	" 9	" 2	85	30	10	2¼	1,200	25 ..	55
52	465 B	" 9	July 31	83	30	10	2	1,140	23 36	60·8
53	468 A	" 9	Aug. 10	93	28	10	3¼	1,140	23 36	52·8
54	581 B2	" 9	July 22	74	22	10	2¼	1,140	23 36	56
55	574 C	" 9	" 24	76	40	9	3¼	1,110	23 6	43·5
56	579 B	" 9	" 22	74	25	9	2	1,110	23 6	56·2
57	464 A	" 9	" 27	79	30	8	2¼	1,080	22 24	57
58	464 E	" 9	" 28	80	35	9	3	1,050	21 42	54·5
59	575 A2	" 9	" 23	75	38	7	3¾	1,020	21 12	38
60	578 B1	" 9	" 24	76	36	8	3	1,020	21 12	40
61	476 C	" 9	Aug. 8	91	34	10	2¼	930	19 18	41
62	578 A	" 9	July 24	76	36	9	3	900	18 36	50
63	462 B	" 9	Aug. 3	86	36	10	2	870	18 6	57

SIX-ROW BARLEY—TEST OF VARIETIES—*Continued.*

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning
					In.		In.	Lbs.	Bus. Lbs.	Lbs.
64	557 C1	May 9	July 22	74	35	10	3	870	18 6	40·5
65	469 D	" 9	" 27	79	27	10	2½	780	16 12	52·5
66	466 D	" 9	Aug. 10	93	28	10	2¾	750	15 30	54
67	475 H2	" 9	" 14	97	35	10	3½	720	15 ..	37·5
68	469 B	" 9	July 27	79	27	10	2½	690	14 18	53·2
69	476 E	" 9	" 28	80	22	10	2½	660	13 36	40·4
70	466 B	" 9	Aug. 14	97	32	10	2¾	600	12 24	47
71	468 B	" 9	" 10	93	32	10	3	600	12 24	50·8
72	476 D	" 9	" 14	97	32	10	2¼	480	10 ..	37·8

The average yield of the 72 plots was 1,667 lbs. (34 bushels 35 lbs.) per acre.

MOST PRODUCTIVE VARIETIES OF SIX-ROW BARLEY.

Among the most productive sorts which have been tested for several years at this Farm are Manchurian A and Odessa. Manchurian is a selected strain of Mensury. Owing to the superiority of the selected strain the parent variety has been dropped.

EARLIEST VARIETIES OF SIX-ROW BARLEY.

Manchurian and Odessa are among the earliest sorts of six-row barley that have been tested. Some of the new cross-bred varieties, which are not yet named, mature more rapidly. These are not yet available for distribution.

BEARDLESS SIX-ROW BARLEY.

The variety known as Champion has been discontinued, and a selection made from Success is being grown instead. Success is earlier than Champion, but neither variety gives a large yield. Several of the new cross-bred sorts mentioned in the table are beardless. It is hoped that some of them will prove superior to the older, named sorts.

HULLESS SIX-ROW BARLEY.

The common sorts of hulless barley known as Hulless White and Hulless Black are characterized by such weak straw that they have been dropped from our list. Several of the new cross-bred sorts mentioned in the table are hulless and some of them display a fair strength of straw.

TWO-ROW BARLEY.

The plots were sown on May 4 and 5. The seed was used at the rate of about two bushels to the acre. The soil varied considerably in character, which caused very irregular returns from the plots.

Gold barley, a new variety from Sweden, kindly supplied by Mr. L. H. Newman, did not reach us until after the regular plots had been sown. It was sown on May 13.

The varieties under numbers are new cross-bred sorts produced by the Dominion Cerealist.

*Named varieties and selectd strains produced at the Central Experimental Farm are marked with an asterisk.

Two-Row Barley—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average length of straw including head.	Strength of Straw on a Scale of 10 points.	Average length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning
					Inches.		In.	Lbs.	Bush. Lbs.	Lbs.
1	475 M	May 5	July 21	77	42	5	3½	3,000	62 24	49
2	Kutais *	" 5	" 22	78	42	0	3¼	2,790	58 6	48
3	Early Chevalier *	" 4	" 22	79	46	3	3¼	2,640	55 ..	47
4	Hannchen	" 4	" 28	85	39	1	3½	2,580	53 36	45·8
5	Gordon A *	" 4	" 28	85	50	3	2¾	2,460	51 12	50·2
6	Swan's Neck	" 5	" 31	87	40	5	3	2,460	51 12	48
7	Gordon E *	" 4	" 28	85	50	1	2¾	2,430	50 30	47
8	Gordon D *	" 4	" 28	85	50	1	2¾	2,400	50 ..	45 5
9	Caucasian Hulless	" 4	" 26	83	30	3	3½	2,370	49 18	57
10	French Chevalier	" 4	" 30	87	45	5	3½	2,310	48 6	47·8
11	Duckbill B *	" 4	Aug. 3	91	40	10	3	2,250	46 42	49·5
12	476 A	" 5	July 31	87	44	3	3¾	2,250	46 42	45.8
13	Duckbill C *	" 4	Aug. 3	91	40	10	3	2,220	46 12	50·2
14	Gordon B *	" 4	July 28	85	50	1	2¾	2,160	45 ..	45
15	567 A	" 5	" 31	87	40	1	4	2,160	45 ..	55·4
16	581 B1	" 5	" 23	79	36	3	3¼	2,160	45 ..	55
17	558 A	" 5	" 22	78	48	3	3¼	2,130	44 18	42·4
18	Canadian Thorpe E *	" 4	Aug. 1	89	38	9	3¼	2,100	43 36	50
19	Jarvis *	" 5	July 26	82	48	10	4¼	2,100	43 36	49
20	Beaver B *	" 4	" 24	81	52	10	4¼	2,070	43 6	47·2
21	Beaver E *	" 4	" 24	81	52	8	4¼	2,040	42 24	48·2
22	Canadian Thorpe D *	" 4	Aug. 1	89	38	9	3¼	2,040	42 24	48·5
23	476 B	" 5	" 3	90	40	10	2¾	2,040	42 24	44
24	Clifford *	" 4	July 28	85	48	3	4	1,980	41 12	47
25	475 D	" 5	" 30	86	40	10	2¾	1,950	40 30	43
26	Standwell	" 5	" 27	83	49	5	3⅛	1,920	40 ..	50·2
27	475 E	" 5	" 30	86	48	3	3¾	1,920	40 ..	44
28	557 B	" 5	" 22	78	48	6	3¼	1,920	40 ..	45·2
29	Swedish Chevalier	" 5	Aug. 1	88	40	3	4	1,890	39 18	47
30	Gold	" 13	" 12	91	32	10	3½	1,890	39 18	48·2
31	Beaver D *	" 4	July 25	82	52	6	4¼	1,860	38 36	47·5
32	Leader	" 5	Aug. 3	90	40	8	3	1,830	38 6	48·5
33	Primus	" 5	" 3	90	44	10	3	1,770	36 42	49·8
34	579 C	" 5	July 27	83	44	5	3	1,740	36 12	55·5
35	Invincible	" 5	Aug. 3	90	40	10	3	1,650	34 18	49 8
36	475 H1	" 5	" 12	99	46	8	4	1,620	33 36	44
37	Black Two-row	" 4	" 1	89	24	5	4	1,500	31 12	48·5
38	578 D	" 5	July 22	78	45	6	3	1,350	28 6	55·2
39	578 C	" 5	" 22	78	45	3	3	1.260	26 12	51·5
40	475 J	" 5	Aug. 13	100	46	2	4	1,020	21 12	42·2

The average yield of the 40 plots was 2,056 lbs. (42 bushels 40 lbs.) per acre.

MOST PRODUCTIVE VARIETIES OF TWO-ROW BARLEY.

The following varieties are among the most productive: Hannchen (a Swedish selection of the famous Hanna barley), Swan's Neck, Standwell, Clifford, Canadian Thorpe, Beaver and the different strains of Chevalier.

EARLIEST AND HULLESS TWO-ROW BARLEY.

Among the earlier sorts are Hannchen, Beaver, Clifford and some strains of Chevalier.

BEARDLESS AND HULLESS TWO-ROW BARLEY.

The varieties of beardless and of hulless two-row barley which have been tested at Ottawa have not, as a rule, shown sufficient strength of straw to make them

profitable sorts for farmers to cultivate. The variety called Caucasian Hulless, which has now been tested for five years, has given good yields, but it cannot be unreservedly recommended, as the straw has shown decided indications of weakness in some seasons.

PEAS.

The plots of peas were sown May 10 and 11, the seed being used at the rate of two or three bushels to the acre, according to the size of the pea.

The variety named Solo is a new, brownish pea from Sweden, which was supplied to this Farm by Mr. L. H. Newman.

The yield per acre is expressed in pounds and also in 'bushels' of sixty pounds.

Varieties under numbers are new cross-bred sorts produced by the Dominion Cerealist.

*Named varieties and selected strains produced at the Central Experimental Farm are marked with an asterisk.

FIELD PEAS—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripening.	Number of days Maturing.	Average length of Straw.	Average length of pod.	Yield of grain per acre.	Yield of Grain per acre.		Weight per measured bushel after cleaning
						In.	In.	Lbs.	Bush.	Lbs.	Lbs.
1	30 D	Medium	May 11.	Aug. 9.	90	55	2¼	1,980	33	..	62·2
2	Arthur Selected*	"	" 10.	" 14.	96	45	2½	1,680	28	..	63
3	30 J	"	" 11.	" 10.	91	50	2⅓	1,680	28	..	63
4	Picton*	"	" 10	" 15.	97	75	2¼	1,590	26	30	63·4
5	26 A	"	" 11.	" 16.	97	55	2¼	1,500	25	..	62·4
6	Golden Vine	Small ..	" 10.	" 16.	98	70	2¼	1,470	24	30	63·4
7	19 B 1	Medium	" 10.	" 14.	96	55	2½	1,470	24	30	62·3
8	30 K 2	"	" 11.	" 10.	91	48	2¼	1,470	24	30	63·5
9	35 B	Large...	" 11.	" 8.	89	55	2¼	1,470	24	30	62
10	35 D	Medium	" 11.	" 2.	83	40	2	1,470	24	30	63·5
11	19 F	"	" 10.	" 14.	96	60	2½	1,440	24	..	63
12	37 D	Large...	" 11.	" 2.	83	40	2	1,440	24	..	62
13	Chancellor	Small ..	" 10.	" 13.	95	70	2¼	1,380	23	..	63
14	Prince*	Large...	" 10.	" 15.	97	70	2½	1,350	22	30	62·2
15	36 A	" ..	" 11.	" 10.	91	50	2¼	1,320	22	..	63·2
16	Daniel O'Rourke	Small ..	" 10.	" 16.	98	70	2¼	1,260	21	..	63·5
17	English Grey	Medium	" 10.	" 16.	98	70	2½	1,260	21	..	62·5
18	Wisconsin Blue	"	" 10.	" 17.	99	65	2¼	1,260	21	..	63·5
19	20 E	"	" 10.	" 14	96	70	2½	1,260	21	..	63
20	30 C	"	" 11.	" 17.	98	60	2	1,230	20	30	63·5
21	Paragon*	"	" 10.	" 14.	96	65	2¼	1,200	20	..	63·5
22	White Marrowfat	Large...	" 10	" 17.	99	70	2⅓	1,200	20	..	63·4
23	31 C	Medium	" 11.	" 10.	91	48	2¼	1,200	20	..	63
24	32 D	"	" 11.	" 2.	83	50	2¼	1,200	20	..	62
25	Mackay*	"	" 10.	" 13	95	65	2¼	1,170	19	30	62·5
26	37 B	"	" 11.	" 17.	98	55	2¼	1,140	19	..	64
27	23 H	Large...	" 11.	" 14.	95	50	2¼	1,080	18	.	61
28	Black-eye Marrowfat	" ..	" 10.	" 18.	100	65	2¾	1,050	17	30	62
29	22 E	Medium	" 11.	" 13.	94	50	2⅓	1,050	17	30	62
30	Solo	Large...	" 11.	" 17.	98	60	2⅓	1,020	17	..	61·2
31	Prussian Blue	Medium	" 10.	" 13.	95	65	2½	960	16	..	62·2
32	23 F 1	"	" 11.	" 14.	95	45	2	900	15	..	63·8
33	23 B	"	" 11.	" 18.	99	60	2⅓	780	13	..	63
34	21 D	Large...	" 11.	" 8.	89	50	2⅓	720	12	..	61
35	21 B	Medium	" 10.	" 15.	97	55	2⅓	690	11	30	64·5
36	23 R1	"	" 11.	" 12.	93	45	2¼	330	5	30	64·2
37	23 R 6 B	"	" 11.	" 14.	95	55	2½	300	5	..	62·8

The average yield of the 37 plots was 1,215 lbs. (20 bushels 15 lbs.) per acre.

RECOMMENDED VARIETIES OF PEAS.

Prussian Blue, Arthur and Chancellor are among the most productive sorts, and are also early in ripening. The Marrowfat varieties and Golden Vine are somewhat later in maturing. Most of these varieties can be obtained from seedsmen in Canada.

Arthur is particularly desirable on account of its high yield and earliness in maturing.

SPRING RYE.

The plots of spring rye were sown on April 28, the seed being used at the rate of about one and one-half bushels to the acre.

The yield per acre is expressed in pounds and also in 'bushels' of fifty-six pounds.

SPRING RYE—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning
					Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Ottawa Select.....	Apr. 28	July 27	90	56	8	4	2,100	37	28	57·2
2	Common.....	" 28	" 27	90	58	8	3½	2,010	35	50	57

The average yield of the two varieties was 2,055 lbs. (36 bushels 39 lbs.) per acre.

WINTER RYE.

The plots of winter rye were sown on August 29, 1910, the seed being used at the rate of about one and one-half bushels to the acre. The rye made good growth in the autumn and stood the winter well.

The yield per acre is expressed in pounds and also in 'bushels' of fifty-six pounds.

WINTER WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning
					Inches.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Dominion.....	Aug. 29	July 18	323	54	4	4¼	3,030	54	6	54·5
2	Mammoth White.....	" 29	" 14	319	56	5	4¼	2,910	51	54	55
3	Thousandfold.....	" 29	" 18	323	55	4	4¾	2,730	48	42	53

The average yield of the three varieties was 2,890 lbs. (51 bushels 34 lbs.) per acre.

FIELD BEANS.

Seven plots of beans, one-sixtieth of an acre each, were sown on May 20 and 22. All of the varieties sown were selected strains of field beans or of early-maturing garden sorts which may prove useful in localities where it is desired to obtain ripe seed in a short season.

The yield per acre is expressed in pounds and also in 'bushels' of sixty pounds.

FIELD BEANS—Test of Varieties.

Number.	Name of Variety.	Distances between rows.	Date of Sowing	Date of Ripening.	Number of Days Maturing.	Average Length of Plant.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after cleaning.
						In.	In.	Lbs.	Bush.	Lbs.	Lbs.
1	Norwegian Brown Selected..	16	May 22	Aug. 8	78	12	4	2,400	40	..	61·5
2	Golden Wax Selected.....	16	" 20	" 12	84	18	3	1,800	30	..	64·2
3	Challenge Black Wax Selected.....	16	" 20	" 8	80	10	2¾	1,290	21	30	61·5
4	Stringless Kidney Wax Selected.....	16	" 22	" 13	83	12	2½	1,200	20	..	61·8
5	California Pea Selected.....	16	" 20	" 21	93	18	3¼	900	15	..	65·0
6	Marrowfat Selected.....	20	" 20	Sept. 14	117	40	3¾	630	10	30	61·5
7	White Field Selected.....	20	" 22	" 14	115	25	3¼	420	7	.	64·5

The average yield of the seven varieties was 1,234 lbs. (20 bushels 34 lbs.) per acre.

FLAX.

Nineteen selected strains from various commercial sorts of flax were grown in sixtieth-acre plots.

The seed was sown on May 20, at the rate of sixty pounds to the acre. The very unfavourable, hot weather caused the crop to be almost a total failure.

FIELD ROOTS.

All the field roots were sown on May 17, and were harvested as follows: Mangels, October 23, Carrots and Sugar Beets, October 24, Turnips, October 25.

The yield per acre of the field roots is calculated from the weight of the crop gathered from one-hundredth of an acre.

Before sowing, the land was made up in drills two feet apart and rolled with a heavy land roller, which flattened the drills nearly one-half, leaving a firm seed bed. When the young plants were about three inches high they were thinned out, leaving them about eight or ten inches apart in the rows in the case of turnips, twelve inches for mangels, and six inches for carrots and sugar beets.

It is probable that, in some instances, varieties which are mentioned in these tables under different names are identical in all essential respects.

In Canada the ton contains 2,000 pounds.

Turnips—Test of Varieties.

Number.	Name of Variety.	Yield per Acre.	
		Tons.	Lbs.
1	Hall's Westbury	32	1,500
2	Good Luck	30	1,600
3	Hartley's Bronze	28	1,400
4	Halewood's Bronze Top	25	1,200
5	Carter's Elephant	25	500
6	Jumbo	21	500
7	Perfection Swede	20	1,400
8	Bangholm Selected	19	1,100
9	Mammoth Clyde	18	1,300
10	Magnum Bonum	17	100

The average yield from the ten plots was 24 tons 60 lbs. per acre.

Mangels—Test of Varieties.

Number.	Name of Variety.	Yield per Acre.	
		Tons.	Lbs.
1	Giant Yellow Globe	28	1,700
2	Half Sugar White	28	100
3	Giant Yellow Intermediate	24	1,600
4	Selected Yellow Globe	23	900
5	Gate Post	21	1,200
6	Perfection Mammoth Long Red	18	1,700
7	Prize Mammoth Long Red	18	1,500
8	Yellow Intermediate	18	1,300

The average yield from the eight plots was 22 tons, 1,750 lbs. per acre.

Carrots—Test of Varieties.

Number.	Name of Variety.	Yield per Acre.	
		Tons.	Lbs.
1	Mammoth White Intermediate	25	600
2	Half Long Chantenay	21	1,000
3	Improved Short White	18	1,500
4	White Belgian	18	1,500
5	Ontario Champion	18	..

The average yield from the five plots was 20 tons, 920 lbs. per acre.

SUGAR BEETS—Test of Varieties.

Number.	Name of Variety.	Yield per acre.	
		Tons.	Lbs.
1	French Very Rich	19	1,800
2	Klein Wanzleben	16	700
3	Vilmorin's Improved	14	400

The average yield from the three plots was 16 tons, 1,633 lbs. per acre.

INDIAN CORN.

The corn was sown with the seed drill in rows thirty-five inches apart, and was also sown in hills thirty-five inches apart each way. When the plants were about six inches high they were thinned out, leaving them from six to eight inches apart in the rows, and leaving four or five plants in each hill. The seed was sown on May 26 and the corn was cut green for ensilage September 20. The yield has been calculated from the weight of crop cut from two rows, each sixty-six feet long.

For the making of ensilage, the corn should be cut when the kernels are in the doughy stage; but the summer at Ottawa is not always warm enough to bring the late varieties to this stage of maturity before it is necessary to cut the crop to avoid serious frost.

INDIAN CORN FOR ENSILAGE—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when Cut.	Weight per acre grown in rows.		Weight per acre grown in hills.	
				Inches.		Tons.	Lbs.	Tons.	Lbs
1	Superior Fodder	May 26	Sept. 20	84	Early milk	15	1,350	17	870
2	Early Mastodon	" 26	" 20	75	"	15	1,020	19	500
3	Eureka	" 26	" 20	82	"	14	1,810	17	100
4	Wood's Northern Dent	" 26	" 20	70	"	14	1,700	16	1,880
5	Selected Leaming	" 26	" 20	105	"	14	1,700	16	340
6	Longfellow	" 26	" 20	100	Glazed	14	600	19	1,380
7	Champion White Pearl	" 26	" 20	110	Early Milk	14	490	10	240
8	Compton's Early	" 26	" 20	79	Late Milk	12	1,630	14	50
9	Angel of Midnight	" 26	" 20	84	Glazed	12	1,190	11	1,650
10	North Dakota	" 26	" 20	92	Doughy	11	1,650	..	.....
11	White Cap Yellow Dent	" 26	" 20	102	"	10	1,120	..	.....

The average yield from the rows was 13 tons 1,660 lbs. per acre.
The average yield from the hills was 15 tons 1,668 lbs. per acre.

INDIAN CORN SOWN AT DIFFERENT DISTANCES.

Three varieties were chosen for this test: Champion White Pearl, Selected Leaming and Longfellow. The seed was sown May 26 and the corn was cut for ensilage September 20. Sixteen rows of each variety were sown; that is, four rows

at each of the distances mentioned, and the yield per acre has been calculated from the weight of crop obtained from the two inner rows in each case. The length of the portions of the rows cut for weighing was sixty-six feet.

Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when cut.	Weight per acre grown in rows.		Distance between the rows.
			Inches.		Tons.	Lbs.	Inches.
Champion White Pearl	May 26	Sept. 20	84	Early Milk	15	1,563	21
" "	" 26	" 20	96	"	15	315	28
" "	" 26	" 20	110	"	14	490	35
" "	" 26	" 20	105	"	15	1,678	42
Selected Leaming	" 26	" 20	77	"	14	1,673	21
" "	" 26	" 20	86	"	14	628	28
" "	" 26	" 20	105	"	14	1,700	35
" "	" 26	" 20	107	"	14	670	42
Longfellow	" 26	" 20	83	Glazed	14	728	21
"	" 26	" 20	89	"	13	508	28
"	" 26	" 20	100	"	14	600	35
"	" 26	" 20	94	"	13	978	42

REPORT OF THE DOMINION CHEMIST

FRANK T. SHUTT, M.A., F.I.C., F.R.S.C.

OTTAWA, March 31, 1912

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa, Ont.

SIR,—I have the honour to submit herewith the twenty-fifth Annual Report of the Chemical Division of the Experimental Farms.

The recent decision to materially reduce the size of the Annual Report of the Experimental Farms has rendered it impossible to discuss, even briefly, all the investigations that have been carried on during the past year. It has been necessary, therefore, to confine ourselves in this report to an account of certain phases of the work, and, in so doing, we have thought it well to select only those investigations and matters which appear to be of general and wide interest and indicative of the scope of our labours. It is hoped that it may be possible to issue bulletins on special subjects more frequently than in the past and thus ensure a more timely and probably more acceptable presentation to our readers of the work of the Chemical Division.

In addition to carrying on research work towards the solution of those problems affecting Canadian agriculture which call for chemical investigation, we have, as heretofore, endeavoured to make the Division directly useful to the individual farmer. This latter branch of our work is largely effected through correspondence, which of late years has steadily and markedly increased. We are daily in receipt of many inquiries relating to soils, manures, fertilizers, feeding stuffs, insecticides and fungicides, etc., etc., in the answering of which a very considerable amount of information of a valuable character is disseminated through the country. In this way the Chemical Division is accomplishing, as no doubt are the other Divisions of the Experimental Farm system, a direct and important educational work.

Very frequently, samples of an agricultural nature accompany our correspondents' letters. The examination of these in many instances, is fruitful of results of general value to the farming community, indicating lines of research that would furnish information of general interest. In this matter of analysis of what may be termed farmers' samples, much discretion must be exercised. To submit to analysis all samples so received would be quite impossible, and indeed unnecessary, but, as time permits, such as warrant analytical work are examined and reported on. In this connection it may be well to point out that we cannot undertake the examination of mineral specimens, of commercial fertilizers, of materials in connection with alleged poisoning cases and those of a purely private or business character. Further, we would impress on our correspondents that there is always a large amount of analytical work on hand and an immediate report is generally impossible. As far as may be practicable, samples and correspondence are dealt with in the order received.

A classified list of the samples received during the past year, with the provinces from which they were forwarded, is presented in the following table:

SAMPLES RECEIVED FOR EXAMINATION AND REPORT FOR THE TWELVE MONTHS ENDED MARCH 31, 1912.

Sample.	British Columbia.	Alberta.	Saskatchewan.	Manitoba.	Ontario.	Quebec.	New Brunswick.	Nova Scotia.	Prince Edward Island.	Total.
Soils	41	496	490	463	35	44	45	6	9	1,632
Muds, mucks and marls	6	....	1	....	2	....	2	4	14	29
Manures and fertilizers	5	....	....	....	2	42	4	4	....	57
Forage plants and fodders	6	35	12	9	44	11	5	12	8	142
Waters	69	15	15	10	153	23	6	7	2	300
Miscellaneous, including dairy products, preservatives, fungicides and insecticides	12	5	16	5	150	27	2	9	5	231
	142	551	534	487	386	147	64	42	38	2,391

The investigations reported on in the following pages may now be outlined. It will be found that they refer to matters of very considerable interest to those who practise general farming as well as to those engaged in the more specialized branches of agriculture.

The Nitrogen-Enrichment of Soils.—This subject is, we believe, one of fundamental importance and, as such, merits the attention of every intelligent farmer. The up-keep of the nitrogen-holding material in the soil is probably the chief factor in maintaining its fertility. The application of farm manures and the growing of legumes as in a rotation, constitute the principal means towards that end and must, therefore, find a place in all systems of rational and successful farming.

The value of the legumes (of which clover is a prominent member) as manurial agents has been determined by us in many ways during the past twenty years, by their analysis, by noting the increase in yields in crops succeeding their growth and by the repeated analyses of soil bearing continuously clover or other legume. It is this latter phase of the question that we here report on. The plot devoted to this experiment is of a light, sandy character, too poor at the outset to be profitably farmed. During the 10 years of the investigation, this soil gained, simply from the growth of clover, on an average, 50 pounds of nitrogen per annum, or, put otherwise, had doubled its nitrogen-content. The value of these data, obtained under what must be considered as unfavourable or disadvantageous conditions, will be obvious. The inevitable losses in humus and nitrogen, consequent upon the necessary cultivation of the soil when growing crops other than those which put the land in sod, are also discussed, with a view of emphasizing the necessity for the adoption of a rotation which includes the periodic growth of clovers and grasses.

Fodders and Feeding Stuffs.—This chapter discusses the composition of a number of feeding materials examined during the past year. These include (1) a series of barleys grown in Alberta, the analyses indicating a high nutritive value; (2) a series of three varieties of Broom corn (*Sorghum vulgare*) grown at Ottawa and cut at two stages of growth, the data pointing to a fodder distinctly inferior to that furnished by Indian corn, but one that as a by-product in the growth of material for broom-making may be taken advantage of for stock feeding; (3) a series of ensilages from clover, Indian corn and the Wagner Wood pea (*Lathyrus sylvestris Wagneri*); (4) Upland Prairie hays from Alberta, hays from rushes and sedges from a reclaimed dyke in Nova Scotia and a hay from Saskatchewan cut from an 'alkali flat' and

consisting essentially of Drop Seed grass (*Sporobolus depauperatus*): and (5) a number of miscellaneous feeding stuffs including meals and milling by-products of various kinds, sent in for examination. In this chapter there will be found much of interest and value to the stock-raiser and dairyman.

The Influence of Heredity in Mangels.—The results of the twelfth year of this investigation are here reported. The Gate Post and the Giant Yellow Globe are the varieties under observation and the data furnish satisfactory proof of the superiority of the former. Each season without exception, the Gate Post has been the richer in dry matter and sugar. This investigation emphasizes that heredity in mangels markedly influences composition, and that the value of farm roots should be determined not only by their yield per acre and keeping properties, but also by their composition, which, to some extent, as we have proved, will depend on the variety.

Sugar Beets for Factory Purposes.—This is a continuation of the work commenced many years ago to determine the relative richness and purity of leading varieties of sugar beets as grown in various parts of the Dominion. From the larger number of points, roots of excellent quality were obtained, indicating that beets suitable for factory purposes can be grown in widely distant districts throughout Canada.

Insecticides and Fungicides.—This chapter will be more particularly of interest to fruit-growers. It includes a fairly complete discussion of commercial brands of Arsenate of Lead and Lime-sulphur Washes, their composition and value. The nature of Phytonal, a newly introduced insecticide manufactured in Germany, is also given. In conclusion, recommendations for the branding of insecticides and fungicides upon the market are suggested, the adoption of which, it is believed, would prove of value both to the user and to the manufacturer of these spraying materials.

The Fertilizing Value of Rain and Snow.—The nitrogen compounds present in the rain and snow as falling at Ottawa have been determined since 1906. For the year ending February 29th, 1912, the rain furnished 5,075 lbs. and the snow 1,025 lbs. per acre. This investigation is being made in concert with agricultural chemists in many parts of the world with a view of determining the value of the rain and snow as suppliers of nitrogenous plant food and of ascertaining the differences that may exist in the atmosphere in various countries in respect to richness in nitrogen compounds.

The Water-Supply of Farm Homesteads.—The practical value of this branch of our work becomes more and more evident, and we can record an ever-increasing interest shown by the farming community in the purity of their water supplies. The results of each sample analysed are fully discussed in the reports sent to these forwarding the waters, but, for the sake of brevity, the purity or otherwise is merely stated in this report. The data are placed on record for the purposes of reference and to furnish the facts upon which the opinion as to the character of the water is based.

As already remarked, this report contains but a part of the work undertaken during the past year. It may be desirable, therefore, in conclusion, to outline some of the more important investigations not here recorded, the publication of which is, for the time deferred. Some of these are still in progress and others await an opportunity for collating and considering the data. ,

Canadian Soils.—Among the more important series of soils examined in the past are the following:

1. A series of soils and sub-soils representative of an area of, say, 2,000,000 acres on the Lower Saskatchewan River (The Pas). The results of our examination indicate that the area involved possesses very considerable agricultural possibilities.

There were many types of soil, ranging from heavy, plastic clays to loose, open sands with some examples essentially peaty in character. There were a few soils that might be termed calcareous. Evidence of alluvial origin was most marked in a number of cases. The necessity of thorough drainage for the improvement of many of these soils was noted. A preliminary report on this series has been written, but work on further samples may be necessary before the data are sufficiently complete for publication.

2. A series of soils from a district on the South West Miramichi River, New Brunswick, examined for the purpose of ascertaining whether the area involved were suitable for agriculture. There were in all forty samples. A very considerable proportion of these were coarse-grained sands and gravels and of decidedly inferior quality. In our report, which was of a tentative character, the view was expressed that the area was better suited to forestry than to agriculture.

3. A small number of Nova Scotian soils typical of well-defined geological areas. The examination, both chemical and physical, of these soils has been very fairly complete and in our report, now in the hands of the Secretary of Agriculture for Nova Scotia, the data are very fully considered. It is hoped to continue this work until we have on record data from all the more important areas or districts of the province.

4. Soils from virgin or unoccupied areas in various parts of Manitoba, Saskatchewan, Alberta, British Columbia. The analysis of many of these is as yet incomplete and, in consequence not ready for publication. It may be stated, however, that the work already accomplished has added much to our knowledge of the soils of these provinces and has enabled us to advise more intelligently those settled, or about to settle, upon these lands.

Conservation of Soil Moisture.—In districts of sparse rainfall, as in certain parts of Northwestern Canada, in which, unless there be provision for irrigation, the so-called 'dry farming' methods are practised, the question of the absorption and retention of moisture by the soil is all-important. The principles of moisture conservation are fairly well understood, but there are yet many features in the economical working of the soil to be satisfactorily settled. The value of sub-soiling, the depth and time of ploughing, the frequency, nature and depth of surface cultivation, the value and kind of sub-surface packing, are all points requiring investigation, both on heavy and on light loams. Isolated experiments with a view of obtaining information on cultural methods as affecting soil moisture have been made by us for some years past, but in the autumn of 1910, a more exhaustive and continuous series of experiments to be carried on at certain of the Western Experimental Farms, was planned, in connection with a series of plots set out by the Agricultural Division and from which data on the yields of grain, etc., would be obtained. By periodic determinations of the moisture of these plots, not only would the value of the various cultural treatments of the soil as regards moisture conservation be learned, but it would be possible to correlate the results with field returns. One season's results have been obtained, but it is proposed to defer their publication until the close of the various rotations under which the lands have been put and which are now running their course. Further, to eliminate seasonal variations and to ascertain the effect of different rotations, this work must be continued for a number of years before any final pronouncement can be made. The determinations in the Laboratory are being made monthly, on samples taken to several depths, from the surface to 18 inches and from 18 inches to 5 feet. This work entails the examination of several hundred samples per month during the spring, summer and autumn seasons.

The season of 1911 was, at several points of experiment, unfavourable to the objects of this research, but, nevertheless, the data show that the moisture content of soils may be distinctly modified by the nature of the cultural methods employed

and further confirm the value of surface cultivation as a means of conserving moisture for crop use.

The Composition of Wheat and Barley as Influenced by Soil and Climatic Conditions.—This research, begun several years ago, has been continued during 1911 by growing wheat of the same stock on twelve of the Experimental Farms and Stations and comparing the composition of the harvested grain with that of the parent seed. Moisture determinations have also been made on the soils growing the grain, periodically from seed time to harvest. Unfortunately, there was unfavourable weather during the latter part of the growing season and during the harvest at a number of the Western Farms; in no less than five cases was the grain more or less frosted. In such cases, of course, the results could not be used for the purposes of this investigation, but testimony was secured which confirms our conclusion from previous work that a rapid development and maturation of the seed tends to produce a grain of high protein content and excellent milling quality.

The Wholesomeness of Frozen Roots.—This experiment was undertaken to ascertain the correctness of certain statements appearing in the press to the effect that frozen roots were poisonous to stock and that the feeding of such frequently gave rise to fatal results. In a trial lasting four weeks, five pens of five pigs each were under observation, frozen mangels and mangels that had been repeatedly frozen and thawed being fed with an equal weight of a good meal mixture. While in certain of the pens the pigs made little or no gain, no impairment of health was observed. The publication of the data is deferred until the completion of the analytical work on the mangels, now in progress.

Meat Inspection Division, Health of Animals Branch, Department of Agriculture.—This work, now in its fifth year, involves the chemical and microscopical examination of various samples collected by the Government Meat Inspectors at the various packing houses in the Dominion. For the year ending March 31, 1912, we analysed and reported on 86 samples, the classification of which is as follows:—

	Samples.
Lard, beef fat and tallow	4
Dye stuffs and colouring matters	31
Preservatives and pickling solutions	25
Spices and condiments	16
Preserved meats	1
Fillers for sausages	2
Jams and catsups	2
Tomato pulp	1
Miscellaneous	4
	86

For the conduct of this work, which necessarily requires special skill and attention, it has been found necessary to detail one member of the chemical staff, whose time is almost entirely occupied in its accomplishment.

In concluding this letter of transmittal, I beg to tender my sincere and hearty thanks to the members of the chemical staff, who have rendered valuable assistance in the various researches undertaken by this Division. Mr. A. T. Charron, M.A., in addition to his duties of First Assistant Chemist, has done most useful work by delivering several courses of lectures in French on agricultural topics.

I have the honour to be, sir,

Your obedient servant,

FRANK T. SHUTT,

Dominion Chemist.

NITROGEN-ENRICHMENT OF SOILS.

CLOVER AS A MANURIAL AGENT.

Our observations, extending over many years and with many types of soil, have convinced us that the up-keep and increase of fertility is largely dependent on the up-keep and increase of the nitrogen-holding, humus-forming material—material such as is furnished by farm manures and the growth and turning under of green crops (or their residues) in general but more especially of those commonly known as the legumes. The important rôle of humus as a constituent of arable soils, in improving texture, increasing the soil's retentive power for moisture, in furnishing, by its decay, plant food in available forms and in supporting the bacterial life of the soil, has been repeatedly emphasized in the publications of this Division. It has also been pointed out that nitrogen may be considered the dominant plant food constituent, the one above all others that determines a soil's productiveness—that humus is its natural storehouse in the soil and that, with the inevitable destruction of humus through cultural operations, nitrogen is dissipated.

These views naturally led us to inaugurate experiments to measure the losses and gains in soil nitrogen under various systems of farming, as well as to ascertain the extent to which nitrogen enrichment could be effected through the growth of legumes. It is one of these latter experiments, having now been in progress for ten years, that may here be reported on. It was instituted to determine by direct analysis of the soil the amount of nitrogen that might become part and parcel of it through the continuous growth of clover, it being decided that the soil at the outset should be a very poor one.

The plot set apart for this work was, in the early spring of 1902, dug out to a depth of 8 inches and the excavation filled in with a well-mixed, light, sandy loam. The soil throughout the plot was by this means made uniform in character. It was, purposely, very poor in humus and nitrogen, so that the results might show the extent to which nitrogen-enrichment could be carried on under what might be termed unfavourable conditions—a soil of this character drying out rapidly in times of drought and clover being a moisture-loving crop. The subsoil was sand. At the outset, the plot was dressed with superphosphate at the rate of 400 lbs. and muriate of potash at the rate of 200 lbs. per acre. No nitrogen was given, but the soil was watered with a solution of 'Nitragin'—a culture for Red Clover received from Germany. Lime at the rate of one ton per acre was worked into the soil in the spring of 1909, as the plot was then showing signs of sourness. The first seeding (Red Clover) was made in the early spring of 1902 and a very fair catch obtained. The plot has been in clover continuously since that date, so that we can now record the results of 10 years' work in this investigation. The crop was cut as occasion seemed to require throughout the season, not permitting the plants to go to seed, and the material was allowed to decay on the soil. Every second year, the plot was dug over and resown. From time to time, the soil of this plot has been sampled and its nitrogen-content determined. The results are tabulated as follows:



The Manurial Value of Clover.—The wagons contain yields of oats from adjoiuing plots of uniform size; that to the left is the crop after grass yield, 36 bush., 13 lbs. per acre; that to the right is the crop after grass mixture containing clover, yield, 46 bush., 4 lbs. per acre.

SESSIONAL PAPER No. 16

NITROGEN-ENRICHMENT OF SOIL DUE TO THE GROWTH OF CLOVER.

—	Date of Collection.	NITROGEN.	
		Percentage in Water-free Soil.	Pounds per Acre to a depth of 4 inches.
Before experiment	13–5–02	·0437	533
After two years	14–5–04	·0580	708
" four years	15–5–06	·0608	742
" five years	30–5–07	·0689	841
" six years	23–5–08	·0744	908
" seven years	4–5–09	·0750	915
" nine years	5–5–11	·0824	1,005
" ten years	22–5–12	·0856	1,044
Increase in nitrogen due to ten years' growth	.....	·0419	511

The increase in organic nitrogen during the period is thus seen to be approximately 500 lbs., or 50 lbs. per annum per acre. This is the first four inches of soil. The increase though continuous, has not been regular. This irregularity was undoubtedly due to the growth of the crop and the dissipation of the residues, with their nitrogen, being unequally affected by the season. Moderately cool and damp weather very materially favoured the clover on this light soil, while a season characterized by high temperatures and long periods without rain meant but little growth after the first cutting. The decomposition of the residues and the dissipation of the nitrogen, due to bacterial activity and other causes, would also no doubt be markedly influenced by seasonal differences, being greatest during those summers that were hot and moist.

Many analyses of the clover crop have been made by this Division in connection with this nitrogen-enrichment investigation and the data show that the annual addition of nitrogen from this source in roots, stems and leaves, may vary, according to the season, character of soil, the presence of nitrogen-fixing bacteria, etc., from 75 to 150 lbs. per asre. If we assume that, in this plot, the growth of the clover annually added nitrogen at the rate of 100 lbs. per acre, then half of this amount owing to oxidation, etc., was lost and the net gain was but 50 per cent of the initial enrichment. Cultivation of the soil involves a certain depletion of its nitrogen; this is inevitable, but, unquestionably, the loss from this cause is greater in light, open soils than in heavy, plastic loams. Our tests conducted at the Experimental Farm, Indian Head, Saskatchewan—a heavy clay soil—however, showed that during a period of 22 years, in which the land was alternately in grain and in fallow, the loss in nitrogen due to cultivation of the soil (including frequent fallowings) more than doubled the amount taken away in the harvested grain. This loss must be made good if productiveness is to be maintained and the only practical methods for the farmer to do this are by the application of farm manures (which of course implies the keeping of stock) and the adoption of a rotation in which, periodically, the soil shall bear a humus and a nitrogen-rich crop—in other words, a forage crop, such as hay or pasture, containing one of the clovers, alfalfa or other member of the legumes.

Of all farm crops, the legumes only can appropriate the free nitrogen of the air and add it to the soil. The property gives them a unique place in any system of cropping. They are, above all others, soil-restorers and their growth, in addition to furnishing most valuable fodder, leaves the soil richer and more productive than before. Farm manures are, and must always remain, the mainstay of the farmer in

enriching his land, but there are few farms indeed on which a sufficient amount is produced to maintain the soil in its best condition, much less to increase its productiveness. He must, therefore, have recourse to the legumes, which, as our experiments in the laboratory and field have shown, may, in a single season, enrich the soil with as much nitrogen as would be supplied by an application of ten tons of ordinary farm manure. If the clover or alfalfa is cut and removed, there still remains in the roots from a good crop a very considerable amount of nitrogen, which, subsequently, is set free in forms suitable for the nutrition of other farm crops. Thus in any case, whether the whole crop is turned under or hay is made, the soil is the richer for its growth, richer chiefly for its added nitrogen, but also for the humus-forming material it has supplied—material that plays so important a part in improving a soil, from every point of view, in making it rich, mellow, retentive of moisture and a suitable habitat for those micro-organisms whose function it is to prepare food and present it in assimilable forms for our farm crops.

FODDERS AND FEEDING STUFFS.

In this chapter we present data from the analysis of a number of fodders and feeding stuffs examined in the Farm laboratories during the past year. These include a series of barleys grown on irrigated and on non-irrigated lands at Strathmore, Alta.; several varieties of Broom corn grown at Ottawa; ensilages from Indian corn, clover and Wood pea; hays from the prairies in Alberta and reclaimed dykes of Nova Scotia, together with several materials, chiefly by-products, not upon the market, and hence not within the jurisdiction of the Inland Revenue Department, and respecting which further information was sought. To these are added a number of feeds purchased for experimental work in feeding at the Central Farm.

BARLEY.

This is an interesting series, comprising Chevalier, New Zealand and Hannchen—well-known two-row varieties—grown on the C. P. R. Demonstration Farm, Strathmore, Alta. Plots of each variety were sown on spring-irrigated, fall-irrigated and non-irrigated land, in order to obtain further knowledge respecting the influence of the soil moisture content on the composition of the grain. This feature of the investigation will be discussed more fully later and in another place; it may suffice here to consider the data briefly from the general standpoint of the composition of Albertan-grown barley.

ANALYSES OF BARLEYS.

Laboratory No.	Variety.	Moisture.	Protein.	Fat or Oil.	Carbohydrates.	Fibre.	Ash.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
9043	Chevalier, parent seed	10·21	10·75	1·87	72·78	2·36	2·03
10977	" non-irrigated	7·62	11 28	2·50	70·65	5·25	2·70
10978	" spring-irrigated	8·00	11·71	2·52	69·78	5·22	2·77
10979	" fall-irrigated	7·81	11·44	2·53	70·49	5·00	2·73
9044	New Zealand, parent seed	9·32	10·75	1·68	72·74	2·85	2·66
10974	" non-irrigated	8·52	13·60	2·21	67·38	5·51	2·78
10975	" spring-irrigated	8·07	13·50	2·52	67·92	5·20	2·79
10976	" fall-irrigated	7·87	13·72	2·44	67·78	5·32	2·87
9045	Hannchen, parent seed	9·46	9·63	2·60	71·52	4·09	2·70
10971	" non-irrigated	7·16	13·64	2·14	70·64	3·85	2·57
10972	" spring-irrigated	8·34	13·06	2·19	69·76	4·05	2·60
10973	" fall-irrigated	8·02	12·78	2·14	70·45	3·96	2·65

The parent seed in the case of the Chevalier and New Zealand was obtained from the Gallatin Valley, Montana, U.S.A., that of the Hannchen was grown in Ontario.

The season was not favourable to the special object of the investigation, being one of unusually heavy rainfall, which no doubt tended to minimize, throughout the growing period, the difference in moisture content of the various plots. In consequence of this, we find the protein-content was practically the same for the grain of any one variety from all three plots non-irrigated, spring-irrigated, and previous fall irrigated. The work, however, has brought out very plainly that there had been a very considerable increase in the protein-content of the barley by its growth in Alberta. This was true in all three varieties, but more marked in New Zealand and Hannchen than in Chevalier.

Our work respecting the influence of environment on the composition of wheat, an investigation carried on for the past seven years, has established the fact that the protein-content of this cereal may be profoundly modified by such factors as soil moisture and temperature during the filling out and maturation of the kernel. It has been found, for instance, that the climatic influences commonly prevailing in the Northwestern provinces during this period in the life of the wheat plant induce a high protein (gluten) content. This is evidently also true for barley and we may, I believe, safely conclude that this cereal—probably the most generally useful for stock feeding of all the grains—will, as grown generally in the Northwest, be found of especially high value as a feeding stuff.

For the purposes of comparison with the foregoing data, we may insert the average composition of 20 samples of Ontario-grown barley, examined by us some years ago.

	Per Cent.
Moisture	11·96
Protein	10·57
Fat or Oil	2·06
Carbohydrates	68·90
Fibre	4·10
Ash	2·41
	100·00

The superiority, for feeding purposes, of the western-grown barley is shown more especially by its higher protein content, but also, to some extent, by its larger percentage of fat and smaller proportion of water.

BROOM CORN.

Several varieties of Broom corn (*Sorghum vulgare*) have been under investigation during the past season (1911) by the Division of Botany, with the view of determining their value for broom manufacture. The opportunity was seized to ascertain the composition of this crop as grown at Ottawa, samples being kindly supplied for analysis by Mr. H. T. Güssow, Dominion Botanist, from the plantation under his care on the Central Experimental Farm. The varieties were Improved Evergreen, Early Japanese and California Golden, and each was examined at two stages of growth, in flower and when the seed was in the 'dough.' At this latter stage it was supposed the crop would be in a suitable condition to cut for broom material. For the purposes of comparison, the average composition of Indian corn at similar stages of growth, is given, the figures being obtained from averages made in 1900 of seven varieties grown on the Central Farm. The data for the broom corn in the following table are for the plant minus the 'brush'—the part used in broom manufacture.

COMPOSITION OF BROOM CORN.

Laboratory No.	Designation.	Water.	Crude Protein.	Ether Extract (crude fat.)	Carbohydrates.	Fibre.	Ash.
		p. c.	p. c.	p. c.	p. c.	p. c.	p. c.
10117	Improved Evergreen, in flower	69·99	1·80	·55	15·70	10·58	1·38
10118	" " , in dough	68·48	1·27	·52	15·05	12·96	1·72
10128	Early Japanese, in flower	71·37	1·50	·49	14.70	10·67	1·27
10129	" " , in dough	68·42	1·25	·53	15·75	12·69	1·36
10158	California Golden, in flower	71·19	1·42	·48	14·70	11·09	1·12
10159	" " , in dough	69·93	1·23	·50	15·60	11·57	1·17
	Indian Corn, Silking	80·76	1·76	·21	10·70	5·19	1·38
	" " , in dough	77·25	1·88	·33	13·10	6·23	1·21

Authorities are practically unanimous that the sorghums—the class of plant to which broom-corn belongs—are distinctly inferior as forage to Indian corn. As they are better able to withstand hot and dry weather than is Indian corn, it is possible that they may find a useful place in the agriculture of so-called 'dry farming' sections, but, in districts favourable to Indian corn, there can be no object in growing them for fodder. From the fact that they very quickly become hard and fibrous once the seed has begun to form, the crop must be cut while still quite young, either for 'soiling' purposes or for curing. As it approaches maturity, the plant loses its succulency and becomes less and less palatable and nutritious.

The present analysis bear out this view, for it will be observed from a study of the data that, even while still green and immature, the percentage of fibre is very high, practically twice that in Indian corn of the same age.

Further, calculated to the same water-content, Indian corn contains considerably more protein—the most valuable of the nutrients from a feeding standpoint. As the broom corn matures, it not only becomes less palatable and less digestible, but less nutritious from the decrease in its protein content.

The best results, judging from the protein content, were obtained from the Improved Evergreen cut early, but the deductions from the series as a whole, point to the necessity of cutting as soon as the plant heads out, if the crop is to be fed green and a palatable, nutritious fodder obtained.

As a by-product in the growth of material for the manufacture of brooms, it may be used, we think, to advantage in feeding, but, grown as a forage crop, our results do not indicate that it would be profitable.

ENSILAGE.

The ensilage here reported upon comprise one from Indian corn and one from 'Wood Pea' sent from L'Institut Agricole d'Oka, La Trappe, Quebec, and a sample of corn and one of clover ensilage from the Experimental Farm at Agassiz, B.C. One or two analyses from our own records are added for comparison.

COMPOSITION OF CORN, WOOD PEA AND CLOVER ENSILAGE.

Laboratory No.	Designation.	Water.	Crude Protein.	Crude Fat.	Carbohydrates.	Fibre.	Ash.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
11010	Corn Ensilage	80·41	1·62	·28	10·44	6·15	1·10
11286	" "	80·49	1·87	·50	9.83	6·01	1·30
	" " (average)	79·10	1·70	·80	11·00	6·00	1·40
11011	Wood Pea Ensilage	51·82	8·23	1·73	19 20	15·18	3·84
11081	Clover Ensilage	63·17	4 01	1·42	12·67	15·78	2·95
	" " (average)	79·10	1·70	·80	11·00	6.00	1·40

Corn Ensilage No. 11010 (Institut Agricole d'Oka). This was from Selected Leaming sown June 20th and harvested October 10th, at which latter date the corn ears were quite immature and the fodder 'watery.' It had been slightly touched with frost a few days previous to cutting. The yield was 12 tons per acre.

In spite of the fact that the corn had not reached the 'glazing stage,' the condition which analysis and experience have shown to be the best for ensiling this crop, and the further disadvantage of being slightly frozen when harvested, the data show that the ensilage was of fair, average quality. Better quality of corn ensilage has come under our notice, but the analytical figures, coupled with the fact that the material was not excessively acid, satisfactorily indicate that ensilage of good feeding quality may be made even in districts considered unfavourable, or at all events, not well suited to the growth of corn.

Wood-pea ensilage No. 11011 (Institut Agricole d'Oka). This was made from the second cutting, the first yielding between 2 and 2½ tons of hay per acre.

The comparative dryness of this ensilage is to be accounted for, we think, by the fact that the second growth was stunted by drought and this would also explain the high perecntage of fibre present.

Compared with corn ensilage on the same basis as regards dry matter and considering chiefly their percentages of protein, it may be concluded that the wood pea ensilage has approximately twice the feeding value of average corn ensilage, weight for weight, and this deduction is supported by the fact that the proportion of the crude protein present as true albuminoids is about the same in both ensilages. The comparatively high fibre-content in this ensilage is certainly a disadvantageous feature; it would no doubt be less in ensilage made from the first cutting.

Difficulty is often experienced in procuring good ensilage from the legumes, (of which the wood pea is a member) no doubt owing to their high nitrogen-content, but the present results confirm our previous experiments with ensiled clover in establishing the fact that, when the crop is not too watery and the proper precautions are taken to exclude access of air when put into the silo, a satisfactory ensilage, not too acid and of very high feeding quality, may be secured.

Clover ensilage, No. 11081 (Experimental Farm, Agassiz, B.C.). This was made in 1910 and, consequently, was over one year and a half old when analysed. T.. clover, with which there was mixed a considerable amount of grass, was cut in the blossoming stage and at once put into the silo.

For ensilage it has very low water-content (63·17 per cent) and this enhances its feeding value when compared with ensilages usually met with, which contain in the neighbourhood of 80 per cent water. That it is exceptionally high in protein is clear from the data, and this will be equally apparent if the composition of this ensilage with that of average clover is compared on the water-free basis. Its somewhat

high percentage of fibre may be accounted for, possibly, by the greater destruction by the fermentative changes in the silo of the less resistible constituents, such as the carbohydrates. Judged from its analysis, this ensilage must be considered one possessing nutritive qualities in a high degree, indeed one that is exceptionally rich.

Corn ensilage, No. 11286. This, as the preceding sample, was made on the Experimental Farm at Agassiz, B.C. The corn was cut in the early milk stage.

The data do not call for any special comment; they indicate an ensilage of average quality. The results in all essential features are very close to the mean from a large number of corn ensilages made in Eastern Canada, and are, from this point, of interest to dairymen and stock feeders in British Columbia.

HAY.

The samples analysed comprise two of Upland Prairie hay from the vicinity of Lacombe, Alta., a series of four hays from Dartmouth, N.S., made from sedges, rushes and red top, but all containing a greater or less admixture of other plants, and a sample of hay chiefly *Sporobolus depauperatus,* cut from an 'alkali flat,' near Bradwell, Sask.

COMPOSITION OF HAY.

Laboratory No.	Designation.	Water.	Crude Protein.	Crude Fat.	Carbo-hydates.	Fibre.	Ash.
		p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
9046	Upland Prairie	9·96	4·50	2·44	45·95	30·00	7·15
9047	"	8·13	7·00	2·88	49·38	27·20	5·41
8863	*Spartina glabra*	5·75	6·69	1·85	46·54	30·80	8·37
8864	*Scirpus americanus*	11·75	6·94	2·05	44·28	28·81	6·17
8865	*Juncus balticus*	11·80	8·17	2·43	44·89	28·07	3·64
8866	*Agrostis alba*	11·05	6·58	2·29	46·96	26·30	6 82
8682	*Sporobolus depauperatus*	3·33	4·25	1·62	52·85	31·85	6·10

Upland Prairie Hay, No. 9046. This was cut late and after frost and rain.

Upland Prairie Hay, No. 9047. This was of the same character, but had been cut early and cured without rain. The first was selling at $8 per ton, the second at $15 per ton.

The analysis established the superiority of No. 9047, and furnished additional proof of the wisdom of early cutting and good curing. In crude protein it is much the richer. In composition, as no doubt in palatibility and digestibility, No. 9046 has suffered much and there is a strong probability that the great difference in price between the hays would be found, by actual feeding, to be no greater than that between their nutritive values.

Hays from a reclaimed Sandy Dyke—

No. 8863. *Spartina glabra,* Salt Marsh grass.

No. 8864. *Scirpus americanus.* A sedge.

No. 8865. *Juncus balticus.* A rush.

No. 8866. *Agrostis alba.* Red top grass.

As already mentioned, these were not pure but contained other plants, the bulk of the hay, however, was as indicated above.

Both sedges and rushes are usually considered unpalatable and poor feed, with a low protein-content and high fibre. In so far, however, as the chemical composition may be taken as a guide to nutritive qualities, the samples in this series makes a very satisfactory showing. Particularly favourable data were obtained for *Juncus balticus* (No. 8865), which ranks highest in the series as regards protein. In this connection, it will be of interest to make the following quotation from the Cyclopædia of Agriculture (Bailey) in which, speaking of wild grasses, the writer says 'In some of the Mountain parks (Rockies) an excellent quality of wild grass is secured. In one of these (South Park, Colo.) a species of rush, *Juncus balticus,* is extensively cut for hay and this hay on the Denver market outranks timothy as a feed for horses.'

Superiority in feeding value is indicated by high protein and low fibre and this allows a certain comparison to be made between the hays of this series as well as between them and others, the composition of which is on record. It must, however, at the same time be borne in mind that the palatability and digestibility—qualities not indicated by the data of composition—are of the greatest importance and that they are qualities very profoundly affected by the stage of growth at which the grass has been cut and by the weather conditions during curing. Deterioration very rapidly takes place as regards digestibility once the seed is mature, and alternate wetting and drying during the process of curing make a hay much inferior to one that is quickly dried and at once stacked or housed. For these reasons, and, in part, to account for the good quality of the sedge and rush hays, I append the following information regarding them as furnished by our correspondent. It should prove of considerable interest to Maritime farmers having access to marshes from which they can cut feed. He writes:—

'I selected these samples as typical of the best hay we had, that is, it was cut early (when the seed was in the dough stage) and was well cured. *Spartina glabra* is ready to cut about the middle of July. *Scirpus americanus* is later and ready the first of August. *Juncus balticus* is very early; it is in its prime about the first of July. *Agrostis alba* (Red top) is usually at its best about the middle of July. The land is a sandy dyke reclaimed from the sea.'

In answer to our enquiry regarding palatability, he states 'We are feeding them right along to stock and obtain very satisfactory results. With the exception of the rush (*Juncus balticus*) cattle prefer these hays to timothy. I do not, however, think they can be quite as nutritious as timothy.'

Hay from an 'Alkali flat,' Sporobolus depauperatus, Laby. No. 8682.—This was forwarded by a correspondent at Bradwell, Sask., who writes 'Until this year, we have never cut this grass, as we thought it of little value. The drought last year (1910) made it necessary to supplement the supply of feed and we cut this grass, of which we have 70 acres.

From these results, I judge it to be of rather low feeding value and distinctly inferior to well-cured upland prairie hays, compared with which it contains less protein and more fibre. Possibly if cut when quite young, the hay might be more nutritious.

Respecting the palatability of this hay, our correspondent says 'Horses will eat it when stabled but leave it for wheat or oat straw stacks if running loose. As pasture, both horses and cattle refuse it until the upland prairie is bare. Steers and dry cattle do pretty well on it, but it is not desirable for dairy cows, the milk yield drops. It seems to cure naturally and well and is little injured, if any, by fall frosts. Apparently horses at large prefer this to brome in winter, for they will more readily uncover it when both are under equally deep snow.'

MISCELLANEOUS FEEDING STUFFS.

Alfalfa grains, Laby. No. 11559.—This purports to be a mixture of ground alfalfa and dried brewers' grains and the claim is made for it that it is 'equal in milk-producing power to twice its weight of bran, though sold at the same price.' Our correspondent states that his cows do not like it and will eat bran in preference.

In appearance it is similar to ground hay, though closer inspection reveals the presence of hulls, presumably of barley. It is of a yellow-green colour and has the characteristic odor of alfalfa hay.

While containing more crude protein and being somewhat richer in fat than bran, this feed is very considerably higher in fibre. The fibrous nature of this feed, together with the fact that the nutritive value of the crude protein in alfalfa hay is not equal to that in bran, make it extremely doubtful if this mixture has feeding properties greater than those of bran. Its exact value as a milk producer could, of course, only be ascertained by actual test.

, The following data allow a comparison, from the standpoint of composition, of the feeding stuffs here discussed.

COMPOSITION OF 'ALFALFA GRAINS.'

—	Water.	Protein.	Fat.	Carbo-hydrates.	Fibre.	Ash.
	p.c.	p.c.	p.c.	p.c.	p.c.	p.c.
Alfalfa Grains	7·59	17·59	4·92	47·02	18·38	4·54
Alfalfa Hay	8·4	14·3	2·2	42·7	25·0	7·4
Dried Brewers' Grains	8·2	19·9	5·6	51·7	11·0	3·6
Bran	11·1	14·5	4·4	54·2	10·1	5·7

Germ Meal, Laby. No. 8641.—This is a product of the Western Canada Flour Mills and its analysis shows it to be a feed of very considerable merit. It has high percentages of protein and fat and is quite low in fibre. It should prove a readily digestible and nutritious feed.

Daisy Chop, Laby. No. 8638.—This material was forwarded from Strathmore, Alta. It is probably an Oat Meal Mill product and belongs to a class characterized by low percentages of protein and large amounts of fibre. By reason of the presence of a considerable amount of oat hull, their digestibility is low and, consequently, their food value small. At the prices usually asked for these feeds, their profitable use is doubtful and better results can, as a rule, be obtained from the standard concentrates, such as bran, shorts, &c.

COMPOSITION OF MISCELLANEOUS FEEDING STUFFS.

Laboratory No.	Designation.	Water.	Protein.	Fat.	Carbo-hydrates.	Fibre.	Ash.
		p.c.	p.c.	p.c.	p c.	p.c.	p.c.
11559	Alfalfa Grains	7·59	17·59	4 92	47·02	18·38	5·54
8641	Germ Meal	5·44	25·00	10·42	51·03	3·87	4·24
8638	Daisy Chop	.....	10·44	4 73	.....	.....	.....
8640	Shorts	6·35	16·35	6·47	60·62	6·30	3·91
10808	Dutch Dairy Feed	7·10	10·74	2·59	58·19	16·27	5·11
11056	Mealine	7·95	17·69	6·10	.....	2·43	.....
11270	Oat Hulls	3·80	3·44	2·12	56·92	28·10	5·62
11057	Oat Flour	6·55	14·88	6·05	.....	4·97	.....
11058	"	8·87	13·06	2·62	.....	11·17	.....
11206	Flax Seed Chaff	6·93	13·44	6·42	43·11	32·05	8·05
11207	Green Flax Straw Shives	4·69	8·00	1·93	29·36	51·85	4·17
11208	Dew-rotted Flax Straw Shives	4·30	3·44	1·29	29·08	59·30	2·59
9794	Cottonseed Meal	6·93	35·12	9·66	32·39	9·70	6·20

Shorts, Laby. No. 8640.—From the Western Canada Flour Mills. Its analysis shows it to be an excellent sample, the data are practically identical with those obtained a few years ago when, while investigating the subject of Canadian brans and shorts, a number of genuine samples were submitted to analysis.

Dutch Dairy Feed, Laby. No. 10808.—This sample was sent from Woodward Cove, N.B., but was stated to be the product of the Robin Hood Mills, Moosejaw, Sask. Inspection shows it to contain a considerable amount of oat hulls and some unground weed seeds. Its analysis places it among the oat feeds spoken of under No. 8638, to which it is very similar in character. It must be considered a feed of low value and much inferior to bran.

Mealine, Laby. No. 11056.—This was sent from Athens, Ont., and is stated to be from the Tillson Rolled Oats Co., consisting of the fine meal sifted from the rolled oats. It is evidently a satisfactory feed of very considerable nutritive value. Its high percentage of protein and fat and low fibre all point in that direction.

Oat Hulls, Laby. No. 11270.—This was sent from Verigin, Sask., the by--product of a mill in that neighbourhood. As might be expected, it is of exceedingly low feeding value, indeed distinctly inferior to that of good oat straw. The analysis agrees with those previously made of oat hulls, the low percentage of protein being further depressed in feeding value by the presence of a large amount of indigestible fibre.

Oat Flour, Laby. Nos. 11057-8.—These were forwarded for comparison, and were the products of two oat meal mills, the names of which could not be procured. The analytical data point unmistakably to the superiority of No. 11057; it is nearly 2 per cent higher in protein and 3½ per cent richer in fat and is much lower in fibre—a feature of considerable importance in feeds of this class. No. 11058 was the more finely ground and might be taken from mere inspection as the more valuable, especially as No. 11057 showed some hulls. These two samples well illustrate the value of analysis for ground feeds of this character.

Flax Seed Chaff: Green Flax Straw Shives: Dew-retted Flax Shives: Laby. Nos. 1206-08. These were obtained from the Canadian Flax Mills, Drayton, Ont., with the view of ascertaining what feeding value, if any, they possessed.

The flax seed chaff, (No. 11206), consisted essentially of chaff, but there was also present a considerable amount of flax straw, which is of a particularly harsh and brittle nature. The analysis shows a notable amount of protein, evidently from the presence of a certain quantity of flax seed. It might, therefore, in spite of its high fibre-content, be supposed to be of some feeding value. If, by fanning or seiving, the proportion of chaff and fragments of straw could be reduced, it would rank with many feeds of recognized worth, but in its present condition, its value as a feeding material is extremely doubtful. We think that it would be found unpalatable and possibly injurious by reason of the brittle, harsh straw it contains.

The green flax straw shives and dew-retted flax straw shives are, in our opinion, quite unsuitable and worthless as feeds, not merely from their low content in protein and fat and their excessive percentages in fibre, as shown by analysis, but by reason of their very coarse and extremely harsh nature. It is of interest to note that on all counts the dew-retted is much the inferior.

Cottonseed Meal, Laby. No. 9794.—This was imported by an English firm from the West Indies. Cottonseed meals as found on the market are extremely variable and, in consequence, should only be purchased on analysis. Genuine, undecorticated meals of the highest grade contain in the neighbourhood of 40 per cent protein, while some of very inferior quality analysed by us have contained not more than 10 per

cent. The percentages of oil and fibre in the very best brands are about 13 and 16 respectively. This sample, therefore, while not conforming with the data from the highest quality meals, is nevertheless a fair sample of average grade.

THE INFLUENCE OF HEREDITY IN MANGELS.

In studying the relative feeding values of the more common types of farm roots, as determined by analysis, it was found that greater differences might exist between two varieties or strains in the same class of roots than between the classes themselves. Thus, while averages taken season by season showed that mangels, as a class, contained more 'dry matter' than carrots, the differences in this regard between many of the strains of mangels examined were frequently greater than between the aforesaid averages. It was further discovered that, arranging the varieties of any class according to their dry matter content, much the same order was obtained season by season. These results seemed to point to certain inherited qualities and that, in spite of seasonal influences on the composition of the root, the relative value for feeding purposes of any particular strain, as compared with other strains or varieties in the same class, would be maintained from year to year. To obtain further information on this interesting point, which implies the transmission of characteristics of composition in roots, two varieties of mangels—the Gate Post or Long Red and the Giant Yellow Globe, were selected in 1900, as typical of the richer and the poorer varieties respectively. These have been grown every season since that time, side by side on practically identical soil and with the same manure and culture, the harvested roots being analysed as to dry matter and sugar content. In the following tabular scheme are presented the data obtained, including those of the past season and the averages of the twelve years' results.

DRY MATTER AND SUGAR IN GATE POST AND GIANT YELLOW MANGELS.

Season of Growth.	GATE POST.			GIANT YELLOW GLOBE.		
	Average Weight of One Root.	Dry Matter.	Sugar in Juice.	Average Weight of One Root.	Dry matter.	Sugar in Juice.
	Lbs. Oz.	Per cent.	Per cent.	Lbs. Oz.	Per cent.	Per cent.
1900	.....	11·14	6·15	.....	8·19	2·64
1901	2 9	9·41	4·15	3 3	9 10	4·08
1902	3 2	13·90	9·39	3 9	10·24	5·24
1903	3 3	12·93	7·38	3 13	10·89	6·17
1904	2 14	12·64	7·62	2 13	9·24	5·26
1905	2 13	12·07	6·83	3 12	8·64	3·55
1906	2 2	12·90	6·59	1 8	12·73	6·45
1907	3 10	12·53	7·25	2 7	10·78	6·34
1908	1 11	12·02	4·94	2 4	10·66	4·47
1909	3 14	11·82	6·64	3 7	10·95	5·82
1910	6 8	9·59	4·26	6 13	7·80	2·74
1911	2 11	10·04	3·86	3 1	6·66	1·85
Average for 12 years	.....	11·75	6·26	.....	9·66	4·55

It will be observed that while the differences in composition between the two varieties are, from year to year, by no means constant, the Gate Post has every season proved the superior root. Taking the dry-matter content as the basis of calculation, it will be found from the average of 12 years that the Gate Post mangel is approximately 20 per cent more nutritious, weight for weight, than the Giant Yellow Globe.

or put otherwise, one ton of the former has the feeding value of 1 ton 427 lbs. of the latter. The average yields of these two varieties for twelve years (1900-1911) at Ottawa, as furnished by the Cereal Division, are Gate Post 32 tons 758 lbs., Giant Yellow Globe 32 tons 713 lbs., which goes to show that there is not much difference between these mangels as to cropping values. However, on calculation, using these averages, as to yield and composition, the superiority of the Gate Post is readily seen, for from it 7,600 lbs. per acre of dry matter would be obtained, whereas from the Giant Yellow Globe, from the same area, there would be but 6,250 lbs.

The 'dry matter' of mangels is completely digestible, or practically so, and is of very considerable value as a source of heat and energy to the animal by reason of its high sugar-content. Comparing these varieties from this standpoint of richness in sugar, it is apparent from the averages of the yearly analytical data that in the Gate Post approximately 50 per cent of the dry matter is sugar, while in the Giant Yellow Globe this percentage is 45, another indication that the Gate Post is the more nutritious variety.

SUGAR BEETS FOR FACTORY PURPOSES.

Continuing the work commenced many years ago, sugar beets of the three well known varieties—Vilmorin's Improved, Klein Wanzleben and Très Riche have been grown during the past season on the several Experimental Farms and Stations. Representative samples of the harvested beets were forwarded for analysis to the Chemical laboratory, where the sugar-content and co-efficient of purity were determined. The results with certain other data are given in the subjoined table.

SUGAR BEETS GROWN ON THE DOMINION EXPERIMENTAL FARMS, 1911.

Variety.	Locality.	Percentage of Sugar in Juice.	Percentage of Solids in Juice.	Co-efficient of Purity.	Average Weight of One Root.		Yield per Acre.	
				Per cent.	Lbs.	Oz.	Tons.	Lbs.
Vilmorin's Improved	Charlottetown, P. E. I.	18·36	21·24	86·4	1	11	17	848
	Nappan, N. S.	17·17	19·51	88·0	1	4	13	..
	Cap Rouge, Que.	15·66	18·89	82·9	1	9	3	1,594
	Brandon, Man.	14·02	17·00	82·5	1	15	17	600
	Indian Head, Sask.	15·08	18·17	82·9	1	2	11	1,232
	Rosthern, Sask.	14·75	18·29	80·6	..	15	24	312
	Lethbridge, Alta., (irrigated)	15·91	18·20	87·4	1	4	20	15
	" " (non-irrigated)	16·28	18·63	87·3	1	3	12	..
	Agassiz, B. C.	17·46	19·37	90·1	1	13	8	1,820
Très Riche	Charlottetown, P. E. I.	16·41	18·17	90·3	1	9	21	438
	Nappan, N. S.	18·45	21·64	85·2	1	2	20	..
	Cap Rouge, Que.	16·15	20·09	80·3	1	1	3	515
	Brandon, Man.	11·72	14·89	78·7	2	7	18	..
	Indian Head, Sask.	13·49	16·97	85·3	1	6	21	1,956
	Rosthern, Sask.	12·42	16·23	76·5	1	4	23	1,520
	Lethbridge, Alta., (irrigated)	18·70	20·09	93·0	1	4	13	920
	" " (non-irrigated)	13·22	17·63	74·9	..	15	9	1,820
	Agassiz, B. C.	17·14	22·43	76·4	1	7	7	1,972
Klein Wanzleben.	Charlottetown, P. E. I.	16·91	18·64	90·7	2	4	20	1,794
	Nappan, N. S.	17·05	18·84	90·5	..	14	21	800
	Cap Rouge, Que.	16·67	21·57	77·3	1	4	4	365
	Brandon, Man.	14·76	16·20	91·1	1	11	17	..
	Indian Head, Sask.	14·86	18 91	78·6	1	8	14	248
	Rosthern, Sask.	12·62	16·09	78·3	..	13	24	1,104
	Lethbridge, Alta., (irrigated)	15·46	18·63	88·3	1	8	15	1,008
	" " (non-irrigated)	12·64	18·09	69·8	1	4	12	840
	Agassiz, B. C.	16·24	19·00	85·4	2	..	8	1,028

The seed used was imported from the house of Vilmorin et Cie, Paris, France, as has been the custom in the past for this invstigation. As the distribution of seed was from the same stock, the results indicate variations in richness, etc., due to the climatic, soil, and, possibly, cultural conditions prevailing in the several localities.

With two or three exceptions, the results are exceedingly satisfactory, alike as to sugar content, purity and tonnage. Commencing in the East, all three varieties at Charlottetown, P.E.I., made an excellent record, the quality of the beets being superior to the average as supplied to sugar factories. The same may be said of the roots grown at Nappan, N.S., where, similarly, the conditions must have been most favourable to the production of a pure and rich beet.

Conditions at the Experimental Station, Cap Rouge, Quebec, were reported as somewhat unfavourable, but, notwithstanding, a very fair beet for factory purposes was grown. The excessive dryness of the season may account for the very small yield.

No results can be given for the beets grown at the Central Farm, Ottawa, owing to an unfortunate oversight which resulted in mixing the several varieties at the time of harvesting.

The beets from Brandon, Manitoba, were not this year of very good quality, though the yield was satisfactory. The season at this point might be said to be unfavourable to this crop, from the standpoint of richness and purity, as the late summer and autumn months were decidedly wet and cool-conditions decidedly against a high sugar content.

At Indian Head, Sask., the beets were of medium quality only, the latter part of the season being too wet for the proper ripening of the crop. At Rosthern in Northern Sask., likewise, the conditions were not conducive to a high sugar content, the latter months being characterized by wet and dull weather with low temperatures. The yields here, as at Indian Head, were excellent.

The data from the beets grown at Lethbridge, Alta., are somewhat difficult to interpret. It was quite dry until about July 25, when wet weather set in and continued practically to the end of the season. To what extent and in what direction these unusual conditions (for this locality) may have affected the crop it seems impossible to say precisely as the results are very irregular. Contrary to expectations, we find in two of the varieties that richer and purer beets were produced on the irrigated area than on that under dry-farming methods. In the third, there was but little difference between the roots of the two areas, either in sugar-content or purity. If, as might be supposed, the non-irrigated land was the drier, it should have given, under the circumstances, the better beets. While certain of the results indicate a good factory root, others are too low, denoting a beet unsuitable for profitable sugar extraction. The yield on the irrigated area was invariably the larger. Our work after three years' investigation does not allow of any conclusions respecting the relative richness of the beets as grown on irrigated and non-irrigated land. Thus in 1908 and 1909, sugar beets grown at this Experimental Farm on irrigated and on dry land showed no great difference, though the roots from the non-irrigated plot were slightly the richer. The yield from the irrigated plots, however, has been always the larger.

All three varieties gave excellent results at Agassiz, B.C., though in one instance the co-efficient of purity is too low.

To allow a comparison of averages from the three varieties as grown, at the several localities, since 1902, the following table has been constructed.

AVERAGE PERCENTAGE OF SUGAR IN JUICE IN SUGAR BEETS GROWN ON EXPERIMENTAL FARMS.—1902-1911.

Locality.	1902.	1903.	1904.	1905.	1906.	1907.	1908.	1909.	1910.	1911.
Charlottetown, P.E.I.	.....	.....	....	.....	.....	.....	.....	.....	14·25	17.23
Nappan, N.S.	15 87	15·33	14·41	16·52	17·08	.....	17·53	16·74	16·43	17·56
Cap Rouge, Que.	.....	.....	.....	.....	.....	.....	.....	.....	.....	16·16
Ottawa, Ont.	16·77	15·34	16·91	12·45	14·37	15·44	16·30	14·84	16·44	.....
Brandon, Man.	....	11·36	16·62	11·09	15·50	16·99	15·82	18·83	18·40	13·50
Indian Head, Sask.	15·15	16·54	15·24	14·94	14·91	15·92	15·66	17·16	.....	14·48
Rosthern, Sask	.....	.....	.....	.....	.....	.....	.....	.....	.....	13·30
Lethbridge, Alta., (irrigated)	.....	.....	.....	.....	.....	.....	16·09	17·91	.....	17·02
" " (non-irrigated)	.....	.....	.....	.....	.....	.....	16·73	18·36	.....	14·65
Lacombe, Alta	.....	.....	.....	.....	.....	13·34	11·21	12·77	12·69	.....
Agassiz, B.C.	.....	17·44	8·10	17·32	14·28	17·65	17·15	18·30	19·18	16·95

Though notable differences are to be observed, none of the averages is so low as to preclude the use of the beets for sugar extraction, and at five points at least very superior roots were grown. Judging from the data of this table, there can be little doubt but that beets of excellent quality may be produced in many widely separated districts throughout Canada.

INSECTICIDES AND FUNGICIDES.

ARSENATE OF LEAD.

This insecticide continues to grow in favour and in many orcharding districts in the Dominion is fast replacing Paris green, the arsenical poison that has, for so many years, held the first place for the destruction of 'biting' insects. Its chief use has been in orchards and for small fruits and it is frequently applied with Bordeaux mixture and lime-sulphur solution, with both of which fungicides it can be employed with safety and success. It has also been used effectively against the potato beetle, though apparently rather slower in its action for this purpose than Paris green.

The properties which specially commend arsenate of lead as the poisonous principle in sprays are great adhesiveness, non-corrosiveness to foliage and, when well made, the quality, after dilution, of remaining a long time in suspension. In all these three particulars, it may be regarded as superior to Paris green. Its well-marked adhesive power naturally affects favourably, lengthens in fact, the period of effectiveness of the spray. The fact that it is non-injurious to foliage renders it possible to use sprays of very considerable strength without risk of burning the leaves. The fine state of division in which the arsenate of lead exists prevents it from readily settling out of the spray and this must certainly contribute towards a uniform application of the poison on the foliage. That it can be used, as already indicated, with the two most popular fungicides, Bordeaux mixture and lime-sulphur wash, without any formation of injurious decomposition products, enlarges its field of usefulness.

Though arsenate of lead is put on the market as a dry powder, presumably for use as a 'dust' spray, its use in this form is very limited, at all events in Canada. Though less bulky than the 'paste,' the powdered arsenate is not so desirable for employment in the making of liquid spray, chiefly from the fact that it settles too rapidly. It is therefore in the paste form that it is almost universally used and many brands of practically standard strength, made by firms enjoying a reputation for first-class products, are widely advertised and may be readily obtained. There are certain difficulties in the manufacture of the commercial 'paste' which militate against the continuous turning out of a product uniform as to water-content, though the aim is to keep the

percentage of water between 40 and 50—which means that the active principle, arsenate of lead—will be between 50 and 60 per cent. The larger firms are now putting a guarantee on the label of the package, stating the percentage of arsenate of lead present in the paste, together with certain other particulars as to soluble and insoluble impurities, and this is a very desirable practice for all manufacturers to adopt. In our analyses of this article during the past two years, we have seldom met with a sample of paste containing less than 50 per cent arsenate of lead. Very few, also contain more than traces of soluble arsenic, an important matter, looking to the harmlessness of the spray to foliage. There is, at present, no accepted or legal standard for arsenate of lead paste, but, reviewing the field in the light of our analyses and those made at the Agricultural College, Guelph, and by the Department of Agriculture, Washington, D.C., we believe that the following requirements would be satisfactory and readily conformed to by manufacturers.

That any arsenate of lead paste to be accounted genuine shall contain at least 50 per cent arsenate of lead; that the arsenic oxide in such combination shall not be less than 12·5 per cent; that the water-soluble forms of arsenic should not exceed one per cent calculated as arsenic oxide, and that there should be no admixture with foreign materials to reduce or affect its strength.

This 'standard' is of course, merely suggested, pending the establishment of one by the Inland Revenue Department, the branch of the Government service which has jurisdiction in such matters and which is at present considering the question. It is, however, a standard which we believe will safeguard the interests of those using this insecticide and one that can be worked to by manufacturers, whether the 'neutral' or so called 'acid' arsenate is made.

From the concluding words of the preceding sentence it will be inferred that two arsenates of lead—the 'neutral' and the 'acid'—are upon the market, and such is the case, though some pastes contain both forms. These two arsenates, differing slightly in their composition, result according to the use of acetate of lead or nitrate of lead to precipitate the arsenic in the process of manufacture of the paste. As considerable controversey has arisen in certain quarters regarding the relative merits of these two forms, the chief points at issue may be briefly discussed.

First, we have been unable to obtain any reliable evidence that the 'neutral' is more adhesive than the 'acid' form, though there is an impression among certain orchardists that such is the case. Experiments to test this point, carried out by the United States Department of Agriculture, have not, to date, indicated any great difference in this respect.

Secondly, while there is some evidence to show that the 'acid' arsenate is somewhat the more toxic, and, therefore, presumably the more valuable as an insecticidal agent, we cannot learn that this has been satisfactorily and finally established.

Thirdly, the claim is made that the 'acid' arsenate is superior to the 'neutral' as regards remaining in suspension. This, if proved, would be an argument of some weight in favour of the 'acid' form, but the evidence needs further confirmation.

Lastly, it is stated that the 'neutral' arsenate of lead is less liable to burn foliage than the 'acid' form. This has some support from experiments made in the United States. Possibly, in a very moist climate, the 'neutral' arsenate may have an advantage in this respect, but no injury has been reported, according to the knowledge of the writer, from the use of the 'acid' arsenate in any part of Canada We may conclude, therefore, that this danger, if such it be, is extremely small and that there is no overwhelming evidence at the present to show that either form is the superior, while, on the other hand, we know that both have been widely and successfully used throughout the Dominion.

PARIS GREEN.

This is placed on the market as a more or less fine powder (the finer the better) of a bright green colour. Undoubtedly it is the best known and the most largely used of all the arsenical insecticides. It is an aceto-arsenite of copper, insoluble in water and genuine samples, on examination, show not less than 50 per cent arsenious oxide. Soluble arsenic compounds should not be present in more than traces. Genuine Paris green is readily and completedly soluble in ammonia; any residue remaining after such treatment would indicate the presence of foreign matter and point to adulteration.

The examination some few years ago of a large number of samples of Paris green by the Inland Revenue Department, collected throughout the Dominion, showed that 95 per cent of those submitted to analysis were genuine, and it may be added that it has been very seldom that adulterated samples have reached the Farm laboratories. Two brands, which apparently had not previously been analysed in Canada and regarding which information was asked, have been examined by us during the past year.

ANALYSIS OF PARIS GREEN.

Laboratory No.	Brand and Manufacturer.	Water.	Total Arsenious Oxide	Cupric Oxide.	Soluble Arsenious Oxide.
		p.c.	p.c.	p.c.	p.c.
8838	"Lion Brand"—J. A. Blanchard, New York City.....	·48	57·61	29·20	1·54
11014	"Schweinfurter Grün" — Chemische Fabrik Schweinfurter, Schweinfurt, Germany....	·77	55·60	30·14	·74

No 8838.—As regards total arsenious acid, this sample is quite satisfactory. It is a genuine Paris green. The percentage of water-soluble arsenic is, however, somewhat higher than is desirable, making necessary the addition to the spray of a certain amount of lime when tender foliage is to be treated. (When used in Bordeaux Mixture no additional lime is needed, as such always contains a sufficient excess of this element to neutralize any free arsenious acid that may be present in the Paris green).

No. 11014.—Other names for Paris green are Schweinfurt's Green, Emerald Green, French Green. This sample labelled 'Schweinfurter Grün' sent us by the manufacturers 'Chemische Fabrik Schweinfurt, Schweinfurt, Germany' is seen to be of excellent quality. It is evidently well manufactured and contains only three-quarters of one per cent of water-soluble arsenic, calculated as arsenious oxide.

PHYTONAL.

This is a newly-introduced preparation manufactured and put on the market as an active insecticide by the Chemische Fabrik Schweinfurt, Schweinfurt, Germany. It is a dark-blue powder, smelling very strongly of ammonia and readily and completely soluble in water. This solution effervesces strongly on the addition of an acid, giving off carbonic acid gas. Analysis of a sample sent us by the manufacturers afforded us the following data:—

	Per Cent.
Arsenious Oxide	9·44
Cupric Oxide	5·28
Ammonium hydrate	40·74
Carbon dioxide	41·50

A second and smaller sample, insufficient for complete analysis gave

Arsenious Oxide	5·77
Cupric Oxide	3·08

In appearance and in giving off a strong odour of ammonia, this resembled the first sample.

Though the two samples are not alike as to their arsenic and copper content (due, no doubt, to loss of ammonia from one of the samples), the ratio of the cupric oxide to arsenious oxide is practically the same in both and, further, this ratio is essentially that of those constituents in Paris green. Thus,

Ratio CuO to As_2O_3, Phytonal, Sample No. 1	1: 1·80
" " No. 2	1: 1·87
" Paris green	1: 1·83

From these facts and from the general composition of the material, we may surmise it is prepared by dissolving Paris green (or a similar arsenical) in carbonate of ammonia and the evaporation, with suitable precautions, of the resulting solution to dryness.

Experiments in the laboratory have shown that, if left exposed to the air, Phytonal quickly decomposes, losing its ammonia and becoming more or less insoluble in water. It is essential, therefore, to keep the material in a tightly corked or stoppered container.

Phytonal, then, is an alkaline, arsenical compound, soluble in water, which from the standpoint of an insecticide, should present the poison in an active form and one non-injurious to foliage. It further seems probable that, used as a fine spray, the distribution of the poison would be more uniform upon the foliage than if the insecticide were merely in a condition of suspension—as is the case with Paris green.

Though no claims are made for this preparation as a fungicide, the probability is that it possesses marked fungicidal properties, since in certain important respects it closely resembles 'ammoniacal copper carbonate'—a spray used efficiently and successfully for many years, especially on maturing fruit and in cases where a stain would be objectionable.

For orchard use the manufacturers recommended the following solution.

Phytonal	2 lbs.
Sugar, syrup or soap	2-4 lbs.
Water	20 gallons.

Experiments are being conducted this season by the Horticultural Division to learn the efficiency and economy of this preparation for orchard use and for the protection of the potato crop.

LIME-SULPHUR WASHES.

The chemistry of the lime-sulphur spray has been discussed in previous reports of this Division and formulae and directions for the home manufacture of the wash, given. Though the use of 'lime sulphur' is steadily on the increase in fruit-growing districts, both as a winter spray against scale insects and for summer use in a more diluted form in the control of injurious fungi, we judge that the preparation on the farm of the spray from its constituents is fast giving place to the purchase of the manu-

factured wash. Unquestionably, the home manufacture is troublesome and disagreeable and considerable work may be avoided by the use of a commercial wash, such as is put upon the market by several firms. As to economy, possibly the 'home made' is somewhat cheaper per unit of disolved sulphur, though freight rates and quantities required will largely determine this point. The commercial wash will keep well if the air be excluded, as by a thin layer of coal oil, and it merely requires dilution to be ready for use. If a concentrated wash, that may be relied on as to strength, can be purchased at a reasonable price, allowing, of course, a certain margin for manufacture, it is more than probable that there will be less and less home preparation. Everything points towards the use of this wash becoming more general and displacing, to a considerable extent, Bordeaux mixture—though this latter fungicide continues to be esteemed as unsurpassed in its efficiency by many orchardists, especially for apple spot.

In our last report, we presented the analyses of a number of commercial brands sold in Canada, the results indicating an evident intention on the part of the manufacturers to put out a well-made wash of satisfactory strength. Further analyses, recently made in the Farm Laboratories, gave the following data:

ANALYSIS OF LIME SULPHUR-WASHES.

Laboratory No.	Brand.	Manufacturer.	Specific Gravity at 17·5° C.	Sulphur in Solution.	
				Total.	As Sulphide.
				p.c.	p.c.
11282	A.W.I.	Clarksburg, Ont.	1·2640	22·16	20·37
11321	Vanco	Chemical Laboratories, Ltd., Toronto	1·2676	23·20	21·87
11359	Grasselli	Grasselli Chemical Company, Cleveland and Toronto	1·2925	25·73	25·09
11385	Niagara	Niagara Brand Spray Company, Burlington, Ont.	1 2855	24·84	24·00
11386	Rex	The Rex Spray Company, Brighton, Ont.	1·3020	25·51	24·43

No. 11282.—This is a 'home-made' wash and was not intended for sale. It is somewhat weaker than the majority of 'commercial' washes, but otherwise is quite satisfactory.

No. 11321.—This sample was taken from a barrel obtained by the Horticultural Division in 1911, and, in consequence, had been manufactured at least nine months. Former samples of this brand have given somewhat higher results (see report 1909, page 186), and it seems quite probable that a certain amount of deterioration, through precipitation of sulphur, had taken place during storage. Exposure to air causes decomposition and deterioration of the wash; such deterioration may be much lessened by covering the wash, if it has to be kept for any length of time after opening the barrel, with a thin layer of coal oil.

No. 11359.—Three samples of this brand (Grasselli) were examined in 1909, and reported as quite satisfactory. The present sample is slightly richer in sulphide sulphur and is a well-prepared wash.

No. 11385.—This is evidently a well-made wash of full strength. It is satisfactory to note that the quality of this brand (Niagara) has, judging from our analyses, continued to improve; the present results place it among the best sprays on the market.

No. 11386.—This brand (Rex) has not hitherto been examined by us. The data afford satisfactory evidence as to its good quality. In both total sulphur and sulphur present as sulphides, it compares very favourably with those brands that are considered as well-made and of full strength.

The strength of the spray is a matter of considerable importance on the grounds of efficiency, economy and, when used in summer, harmlessness to foliage. Strength depends essentially on the amount of sulphur present as sulphide, though it is quite probable that other sulphur compounds, formed in variable amounts during the boiling of the wash, as thiosulphate, have some fungicidal value. To determine accurately the total sulphur in solution and the proportion of this sulphur present as sulphide, a chemical analysis is necessary, but for practical purposes, *i.e.*, for orchard use, it is sufficient to ascertain the specific gravity or density of the solution. In all well-made washes we may say that, the sulphide sulphur will vary (within small limits) with the density; the higher the specific gravity, the larger the proportion of sulphur present.

Although many experiments have been made in Canada and in the United States, during the past few years, it cannot be said that rigid standards as regards the best strengths of this spray for its various purposes have been as yet firmly established or generally recognized. No doubt climatic conditions prevailing in the district in which the spray is used materially influence its efficiency, and it is quite probable that the humidity of the atmosphere may, as with many fungicides, markedly affect its usefulness and harmlessness. However, sufficient evidence is on record to indicate that for San José (and probably other) scale on dormant trees in spring or autumn, the specific gravity of the spray should be in the neighbourhood of 1·03. For summer use, when the trees are covered with foliage, for control of the apple scab or 'spot' (and probably other fungous diseases) the specific gravity of the wash must not exceed 1·01 and, many orchardists use a spray for this purpose as low as 1·007. The preparation of such sprays by dilution, either from home-made washes or the purchased commercial washes, is a matter of comparative simplicity once the specific gravity of the original wash is known. Home-made washes vary greatly in strength, according to the formula employed and the thoroughness of preperation, and if a spray of known density is to be used, the specific gravity of the wash must be ascertained and the dilution made accordingly. Home-made washes examined by us have varied from 1·028 to 1·24 specific gravity. There is not the same variation to be found in commercial lime-sulphur washes put on the market by reputable firms, but, nevertheless, if exact work is to be done and the density is not stated by the manufacturers, the specific gravity should be taken.* The larger number of commercial brands examined in the Farm Laboratories during the last three years have ranged between 1·29 and 1·32 specific gravity, though a few have fallen as low as 1·26 or even 1·25.

To determine the density of a wash or spray, a specific gravity spindle or hydrometer will be necessary, and one ranging from 1,000 to say, 1,400, with a glass cylinder to hold the wash or spray while the determination is being made, can be purchased from a wholesale chemist or chemical supply house for about $1. The wash or spray to be tested is poured into the cylinder and the spindle carefully inserted; when the spindle has come to rest the scale indicating the specific gravity is read at the surface of the fluid. In the case of a home-made and self-boiled wash the temperature of the fluid should be allowed to fall to that of the atmosphere before making the test.

To ascertain the degree of dilution necessary to obtain a spray of a certain

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* We believe it would be in the interests of all concerned if manufacturers would state the specific gravity of the wash on a label attached to the container. A law to this effect, properly enforced, would, in our opinion, greatly assist the orchardist and do no injustice to the manufacturer.

strength, the decimal of the specific gravity of the wash is divided by the decimal of the specific gravity of the spray desired; the quotient indicates the necessary dilution or put otherwise, the total volume to which one volume of the wash must be diluted. One or two examples may be given by way of illustration.

'A' is a home-made wash, found to have a specific gravity of 1·21. The necessary dilution for the spray on dormant wood will be obtained by dividing ·21 by ·03. Thus, $\frac{\cdot 210}{\cdot 03} = 7$ or total dilution required, using one volume of the wash. In practice this means that one gallon of the wash diluted with six gallons of water will yield seven gallons of spray of the desired strength, namely, 1·03 specific gravity.

If a summer spray of the density 1·009 is desired, the fraction will be $\frac{\cdot 210}{\cdot 009}$ = 23·3, or, one gallon of the wash must be diluted with twenty-two and one-third gallons of water.

'B' is a commercial wash with a specific gravity of 1·30. For the winter wash the fraction will be $\frac{\cdot 30}{\cdot 03}$ = 10, or 1 gallon to 9 gallons of water; for summer use we have $\frac{\cdot 30}{\cdot 009}$ = 33:3, or approximately 1 gallon to 32 gallons of water.

After dilution of the concentrated wash, the spray should be well stirred.

We have given this information for those using various formulæ in the preparation of home-made and self-boiled washes and for those who are desirous of doing exact work with the commercial brands. It is, however, open to question, in the present state of our knowledge, if the exact strength of the spray is a matter of vital importance, that is, as regards insecticidal and fungicidal effectiveness and harmlessness to foliage, though certain limits must of course be regarded. As we have said, most of the commercial washes of the larger firms have densities between 1.29 and 1.32 and, if a guarantee to this effect can be obtained, it would seem, judging from such evidence as is available, that dilutions could be made without any preliminary testing of the wash.

Using such washes for the preparation of a spray on dormant wood, dilutions from 1 to 8 to 1 to 11 have been recorded as equally effective.* Similarly, with these washes, dilutions ranging from 1 to 30 to 1 to 40 have been used without injury to foliage and good results as regards efficiency obtained. If such be the case then, having the approximate density, the taking of the specific gravity by the orchardist and the making of the subsequent calculation, may be safely omitted. We have always counselled carefulness in the making of sprays, and in this matter of the lime-sulphur wash useful information could no doubt be obtained by experimental work with sprays the exact strength of which had been established. We are, however, of the opinion that good and safe work can be done without using a hydrometer, provided a lime-sulphur wash of guaranteed density be employed.

In concluding this brief chapter, which indicates in part the nature of our work on these preparations, the writer wishes to suggest that the composition, at all events as regards active constituents, of manufactured insecticidess and fungicides should be printed on the label of the package. In the case of lime-sulphur washes the density should be stated. This would be useful information, as well as a guarantee

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* The so-called winter spraying, viz., that used on dormant wood, is undoubtedly of the greatest importance; indeed, in the opinion of many orchardists, the most valuable of all the sprayings. This spraying, therefore, should never be neglected. In view of this, it seems desirable to point out that, as there is at the season of application, no foliage to injure, great care in regulating the strength of the spray is quite unnecessary. It is, of course, important that the spray shall be sufficiently strong to be effective—about 1·03 specific gravity, but if the spray is somewhat stronger it is immaterial, save perhaps on the score of economy.

to the purchaser and an advertisement of value to the reputable manufacturer. The law provides that information as to composition shall be given in the case of fertilizers and cattle foods of various kinds and it seems equally desirable that, in a similar way, the users of spraying materials should be informed and protected.

THE FERTILIZING VALUE OF RAIN AND SNOW.

This is a problem that has lately been receiving attention at the hands of agricultural chemists in many parts of the world and, thus, data of wide interest are accumulating towards a knowledge of the nitrogen compounds that may be annually washed out of the atmosphere by rain and snow to enrich the soil, in many latitudes, in countries of heavy and light precipitation, in rural districts and in the neighbourhood of towns and cities.

The systematic examination at Ottawa of every fall of rain and snow which would yield a sufficiency from the catchment area employed, was begun in 1907, so that we are now able to present the results from the fifth year of the investigation. It is our intention to continue the examination until a record for ten years has been obtained. The Central Experimental Farm, where collections are made, is situated on the outskirts of Ottawa, a rapidly growing city, but one which is residential rather than manufacturing, though from time to time a tall chimney is built to add its quota of smoke. As a rule the atmosphere is very clear, general smokiness or fog being exceptional. The catchment basin is placed about twenty-five feet from the ground, which for some distance around is covered with grass and shrubbery. This arrangement, we think, prevents, to a considerable degree, contamination with dust, a factor that our results show, from analyses after high winds, affects the data more markedly than smoke, though no doubt the direction of the prevailing wind, either to or from the city, somewhat influences the nitrogen-content of the rain. Another factor affecting this datum and one that has been many times remarked, is frequency of precipitation. Thus, after a period of several days or longer of dry weather, the nitrogen-content will be high, whereas samples taken from a succession of rains following one another at short intervals show a steady decline as the atmosphere is purified by successive washings. Violent thunderstorms, especially after a period of drought, usually means an excessive nitrogen-content in the rain, probably largely owing to the air at the time being full of dust resulting from the high winds usually accompanying them, though no doubt the electric discharges (lightning flashes) increase somewhat the proportion of nitrates.

In the following table are presented the monthly totals for the precipitation, the average nitrogen-content for the month expressed as 'free' and 'albuminoid' ammonia and as nitrates and nitrites and the pounds of nitrogen per acre so supplied. The number of analyses made of rain and snow within the year was 92.

RAIN AND SNOW AT OTTAWA FOR THE YEAR ENDING FEBRUARY, 1912..

Month and Year.	Precipitation in Inches.			Nitrogen.				Pounds of Nitrogen per Acre.
	Rain.	Snow.	Total in Inches of Rain	In Free Ammonia.	In Albuminoid Ammonia.	In Nitrates and Nitrites.	Total.	
1911.				p.p.m.	p.p.m.	p.p.m.	p.p.m.	
March	·26	19·75	2·24	·409	·055	·154	·618	·314
April	1·07	4·00	1·47	·615	·159	·294	1·068	·356
May	2·80	.....	2·80	·914	·148	·406	1·468	·931
June	3·64	.....	3·64	·330	·045	·140	·515	·425
July	2·79	.....	2·79	·675	·132	·510	1·317	·833
August	1·47	.....	1·47	·650	·055	·432	1·137	·379
September	2 98	.....	2·98	.683	·107	·414	1·204	·813
October	2 10	.....	2·10	.675	·025	·332	1·032	·491
November	1·73	12·00	2·93	.602	·055	·252	·909	·604
December	1·31	13·75	2·68	·357	·035	·231	·623	·378
1912.								
January	·11	25·00	2·61	140	·066	·177	·383	·226
February	·07	29·75	3·05	·271	·049	·187	·507	·350
Total for 12 months	20·33	104·25	30.76					6 100

The total precipitation, 30·76 inches, exceeded that of the preceding year by 3·79 inches but was not quite equal to the average for the past 21 years, which is 34·21 inches. Compared with the record of the previous twelve months, we find the snowfall 31·25 inches, and the rain ·66 inches, heavier. The precipitation was well distributed throughout the year; in two months only—April and August—was the fall less than 2 inches, and in one month only, June, can it be said to have notably exceeded 3 inches.

The amount of combined nitrogen in the rain and snow during the year, it will be observed, was 6·1 lb. per acre, which is ·829 lbs. more than for the previous year and, if we except 1909 when the results were abnormally high, owing to bush fires, ·459 lbs., above the average from the yearly data during the period of investigation, February, 1907-February, 1912. The following tabulated statement allows of a ready comparison of the precipitation data and amounts of nitrogen per acre determined during the past five years.

PRECIPICATION AND AMOUNT OF NITROGEN PER ACRE, OTTAWA, 1908-1912.

—	Rain in Inches.	Snow in Inches.	Total Precipitation in Inches.	Pounds of Nitrogen. per Acre.
Year ending February 29, 1908	24·05	133·00	37·35	4·322
" " 28, 1909	22·99	96·25	32·63	8·364
" " 28, 1910	28·79	80·75	36·87	6·869
" " 28, 1911	19·67	73·00	26·97	5·271
" " 29, 1912	20·33	104·25	30·76	6·100
Average for 21 years	24·99	92·18	34·21	

The nitrogen furnished by the rain was 5·075 lbs. and by the snow 1·025 lbs., the proportion of the whole being 83 per cent and 17 per cent respectively. For the experimental period the figures in this regard are as follows:—

AMOUNTS OF NITROGEN FURNISHED BY RAIN AND SNOW.

—	Total	By Rain.		By Snow.	
		Pounds.	Proportion.	Pounds.	Proportion.
	Lbs.		Per cent.		Per cent.
Year ending February 29, 1908.....	4·322	3·243	75	1·080	25*
" " 28, 1909	8·364	7·528	90**	·836	10
" " 28, 1910.....	6·869	5·83	85	1·04	15
" " 28, 1911	5·271	4·424	84	·847	16
" " 29, 1912.....	6·100	5·075	83	1·025	17

* Snowfall exceptionally heavy.
** Rain abnormally rich in ammonia due to bush fires.

Of the total nitrogen furnished per acre (6·1 lbs.) we find 4·209 lbs., or approximately 70 per cent, as free and organic ammonia and 1·891 lbs., or approximately 30 per cent, as nitrates and nitrites.

AVERAGE NITROGEN-CONTENT OF RAIN AND SNOW.

(Amount of Nitrogen per Acre as Free and Albuminoid Ammonia and as Nitrates and Nitrites.)

—	Number of Samples Analysed.	Precipitation in Inches.	NITROGEN.								
			Parts per Million.				Percentage of Total.			Per Acre.	
			In Free Ammonia.	In Albuminoid Ammonia.	In Nitrates and Nitrites.	Total.	In Free Ammonia.	In Albuminoid Ammonia	In Nitrates and Nitrites.	As Free and Albuminoid Ammonia.	As Nitrates and Nitrites.
Rain.....	62	20·33	·694	·078	·330	1·102	63	7	30	3·553	1·522
Snow.....	30	104·25	·228	·053	·157	·438	52	12	36	·656	·369

Again, the data show the greater richness of the rain in nitrogen compounds, and the evidence supports our previous statement that, both relatively and absolutely, rain furnishes more nitrogen to the soil than snow.

As in the preceding year, 70 per cent of the nitrogen in the rain was free and organic ammonia and 30 per cent as nitrates and nitrites. For the snow we obtain 64 per cent and 36 per cent, respectively, for these compounds.

THE WATER SUPPLY OF FARM HOMESTEADS.

The shallow well, that is, one usually between 10 and 30 feet in depth, collecting the water from the surrounding soil and subsoil, is the source of supply most commonly found on the farm homestead and in the village. Provided that the environment is satisfactory from the sanitary standpoint, such wells may yield excellent water, but when, as is usually the case, convenience to the house or farm buildings is alone considered, the chances are that it is only a very short time after the location of the well before the water is polluted. On the larger number of farms we find the well sunk in the barnyard (where there must necessarily be more or less of an accumulation of manure) or under the barn or stable, or at no great distance from the privy (frequently a mere hole in the ground), or close to the back door, out of which the household slops are thrown and near which the garbage heap with all sorts of refuse may be found. It cannot be too strongly emphasized that wells so situated inevitably become contaminated.

It is quite true that most soils, and more particularly those that are porous and well aerated, such as gravels and sands, possess filtering and purifying properties in a marked degree, but the soil surrounding wells located as described must in time become saturated with organic filth of a most objectionable character, and it is then no longer able to purify but rather serves to contaminate the water passing through it to the well, which, under such conditions, may be said to act as a cess-pit.

Further, we frequently find these wells through faulty construction or insufficient protection become the watery grave for rats, mice, frogs and other small animals, the decomposing bodies of which render the water foul and unfit for use. Rotten crib work is another but not so dangerous a source of contamination. Imperfect protection of the mouth of the well may also allow the entrance of surface wash. If these latter features are guarded against and the well lined to a depth, say, of 10 feet with puddled clay or concrete, safeguards of very considerable value have been provided but they must not be solely relied on if the well is badly located.

For those who must depend on the shallow well as the source of their supply, we would strongly advocate an undisturbed area, say of 50 yards radius around the well, to be kept free from manure and all deposition of filth.

Much better water, as a rule, can be obtained from the bored or driven well, tapping a deep-seated source, and especially is this the case when the rock strata through which the well is driven are free from fissures and cracks and care is taken that there is no possibility of surface water finding its way downwards between the piping and the sides of the boring. With such a well and a pump actuated by a windmill, small gasoline or hot air engine, water of good quality can be supplied to the farm buildings for the watering of stock and to the farm house for the bath room and kitchen. Such an arrangement would mean much, not only in the matter of convenience and the saving of labour, but in the still more important matter of securing a supply that would lead to better thrift in the stock and better health in the family.

Since 1887, we have analysed some thousands of samples of waters from farmers' wells and a survey of this work shows that not more than one-third of the waters examined in any year could be pronounced as safe and wholesome. These results may not represent the condition of the farm supplies throughout the Dominion, but of this there can be little doubt, that of the waters used on our farms there is a large proportion positively unsafe for use. Yet there is probably no better watered country in the world, the natural waters of Canadian lakes, streams and springs being of the purest. It is quite possible, therefore, on the majority of farms, save in certain semi-arid districts of the Northwest, to obtain an ample supply of good water. Admitting this, it seems well worth while to continue the crusade for better water on

the farm, and in this connection it is gratifying to be able to report an increasing interest in the matter of pure water on the part of our rural population. Instances are becoming more numerous every year of farmers going to considerable expense to secure a good and ample supply, and piping it for use in the farm house and for the watering of their stock.

In the appended table, the sanitary analyses of 90 samples examined during the past year are given. Of these, 22 were reported as pure and wholesome, 26 as highly suspicious, 24 as seriously contaminated and 18 as saline.

In conclusion, it may be stated that analyses of well waters are made free of charge by the Division of Chemistry, Experimental Farm, Ottawa, provided the samples are collected and shipped in accordance with instructions that are sent on application.

ANALYSES OF WELL WATERS, 1911–12.

Reesults Stated in Parts per Million.

Number.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
1	Evesham, Sask.	E.G.	April 1	Free.	·04	·06	2·8	666·4	495·2	171·2	F. trace.	Free from pollution.
2	Breckenridge, Que.	W.J.G.	" 3	2·60	·03	Free.	1600·0	2699·2	2530·0	169·2	Free.	Saline.
3	Margo, Sask.	V.P.	" 4	Free.	·47	"	30·0	4924·0	3852·0	1072·0	"	"
4	Maidstone, Sask.	E.C.	" 4	1·56	·06	·12	106·0	1892·8	1674·4	218·4	"	Free from pollution.
5	Rockland, Ont.	W.C.E.	" 8	Free.	·01	3·12	5·0	332·8	264·0	68·8	"	Probably free from pollution.
6	Breckenridge, Que.	W.J.G.	" 15	2·55	·02	Free.	1600·0	2686·0	2518·4	167·6	V. F. T.	Saline.
7	St. Philip, Que.	J.R.	" 22	·15	·04	"	350·0	933·2	880·0	53·2	Free.	Suspicious.
8	Endiang, Alta.	R.A.	May 3	3·99	·12	"	50·0	3157·0	1850·0	307·0	"	Saline.
9	Ottawa, Ont.	F.S.A., No. 1.	" 3	·02	·18	·17	6·0	64·0	29·2	34·8	"	Unpolluted.
10	"	" " 2.	" 3	·21	·07	·09	3·5	157·6	126·4	31·2	....	"
11	"	" " 3.	" 3	·92	·01	·62	2·5	185·6	152·0	33·6	....	"
12	Lamerton, Alta.	F.W.F.	" 13	·02	·12	3·03	22·0	4227·0	3592·0	635·0	Free.	Strongly saline.
13	Outlook, Sask.	J.E.A.	" 16	·02	·22	·19	72·8	6131·0	4981·5	1149·5	"	" "
14	Kamloops, B.C.	T.C.H., No. 1.	" 20	Free.	·03	·18	17·5	775·2	646·4	128·8	"	Free from pollution.
15	"	" " 2.	" 20	·03	·015	·10	9·0	551·2	444·8	106·4	"	" "
16	Sussex, N.B.	S.C.McC., No. 1	June 2	Free.	·04	·39	4·0	202·4	160·0	42·4	"	Good and wholesome.
17	"	" " 2	" 2	"	·03	·00	5·0	79·2	52·0	27·2	"	" "
18	Ottawa, Ont.	W.L.S.	" 5	"	·12	8·84	35·0	454·4	274·4	180·0	"	Very suspicious.
19	Clarkstown, Ont.	A.B.	" 7	·43	·05	Free.	38·0	601·2	538·8	62·4	"	Not potable.
20	Rivermeade, Que.	J.R.	" 7	·23	·24	5·66	38·0	644·8	460·8	184·0	"	Seriously contaminated.
21	Blakeney, Ont.	J.McG.	" 10	1·08	·03	Free.	108·0	714·8	600·0	114·8	"	Probably contaminated.
22	Chatham, N.B.	J.B.S., No. 1.	" 17	·07	·03	"	520·0	1016·0	973·6	142·4	"	Saline.
23	"	" " 2.	" 17	·27	·05	8·42	300·0	1121·6	852·0	269·6	"	"
24	Dunham, Que.	G.P.E.	" 19	Free.	·18	5·70	30·0	214·4	145·6	68·8	"	Very suspicions.
25	Parc Laval, Que.	Z.P.	" 28	·19	·06	5·88	40·0	618·8	480·0	138·8	"	Polluted.
26	Oak Bluff, Man.	W.W.	" 29	2·40	·13	Free.	350·0	2314·0	1903·0	411·0	Trace.	Contaminated.
27	The Brook, Ont.	Z.L.	July 4	3·22	·13	"	1750·0	3241·6	2960·0	281·6	Free.	Saline.
28	Ottawa South, Ont.	G.A.	" 7	Free.	·03	10·75	18·0	450·0	230·0	220·0	"	Suspicious.
29	Rockliffe, Ont.	A.K.	" 19	·06	·10	2·03	9·0	458·0	298·0	160·0	"	"
30	C. Ex. Farm, Ont.		" 20	Free.	·04	·92	6·0	306·0	229·0	77·0	"	Unpolluted.
31	Shelburne, N.S.	W.J.McG.	Aug. 3	3·60	·10	·83	110.0	190·0	152·5	37·5	"	Very seriously contaminated.
32	Hurdman's Bridge, Ont.	T.C.E.	" 5	·42	Free.	Free.	30·5	299·2	278·0	21·2	"	Suspicious.
33	Minton, Que.	S.K.	" 5	·10	"	·88	2·0	110·0	70·0	40·0	"	Probably contaminated.
34	Aylmer Road, Que.	G.L.O.	" 10	Free.	"	·03	5·0	273·6	205·6	68·0	"	Excellent
35	Elkhorn, Man.	C.E.R.	" 11	1·47	"	Free.	150·0	1862·8	1598·8	264·0	"	Suspicious.

ANALYSES OF WELL WATERS, 1911-12—*Concluded.*

RESULTS STATED IN PARTS PER MILLION.

Locality.	Locality.	Marks.	Date.	Free Ammonia.	Albuminoid Ammonia.	Nitrogen in Nitrates and Nitrites.	Chlorine.	Total Solids at 105° C.	Solids after Ignition.	Loss on Ignition.	Phosphates.	Report.
36	Cayley, Alta	H.C.W	Aug. 15	Free.	·04	Free.	13·0	2560·0	2510·0	50·0	Free	Free from organic pollution.
37	Shepard, Alta	D.W.T	" 16	"	·05	"	20·0	604·0	564·8	39·2	"	Free from contamination.
38	High Falls, Que	L.P.	" 16	·20	Free.	"	1900·0	4221·2	3266·0	955·2	"	Saline.
39	Rivermede, Que	J.A.R.	" 21	·06	"	·08	21·0	402·0	316·0	86·0	"	Contaminated.
40	Winona, Ont	J.J.F	" 21	5·00	"	Free.	1150·0	4982·0	4168·0	814·0	"	Strongly saline.
41	Shanly, Ont	T.R.W	" 23	·37	·10	"	80·0	608·0	440·0	168·0	Hy. trace	Dangerously polluted.
42	Bonfield, Ont	J.H.T.	" 23	·07	·08	1·14	4·5	82·8	48·4	34·4	"	Contaminated.
43	Applehill, Ont	P.D.McI.	" 23	Free.	Free.	2·05	30·0	343·0	238·0	105·0	Free	Decidedly suspicious.
44	Hull, Que	L.G.S	" 25	·23	"	Free.	80·0	476·8	454·8	22·0	V. F. T	Suspicious.
45	Carlsbad Springs, Ont	L.B	" 29	9·00	·23	"	5200·0	13310·0	8925·0	4385·0	F. trace	Saline.
46	" "	"	" 29	4·00	1·13	"	5200·0	13195·0	8790·0	4405·0	Free	"
47	Rivermede, Que	J.A.R.	" 30	·06	Trace.	·07	15·0	347·6	282·0	65·6	Trace	Contaminated.
48	St. Barnabé, Que	E.B	Sept. 5	11·10	·20	Free.	5150·0	9650·0	9010·0	640·0	Hy. trace	Strongly saline.
49	Sand Point, Ont	A.D.	" 7	2·70	·76	"	15·0	394·0	258·0	136·0	"	Dangerously polluted.
50	Ironsides, Que	P.S	" 13	Free.	·02	·40	1·0	132·0	72·0	60·0	Free	Excellent.
51	St. Hyacinthe, Que	S.P.M., No. 1	" 15	·33	·03	Free.	70·0	605·0	425·0	180·0	F. trace	Suspicious.
52	" "	" " 2	" 15	·35	·02	"	70·0	574·0	460·0	114·0	"	"
53	Aylmer, Que	L.D.S	" 18	·16	·02	"	18·5	212·0	178·8	33·2	Free.	"
54	Victoria, B.C	J.D	" 21	·13	Free.	"	7·5	140·0	108·0	32·0	Trace	Wholesome.
55	Rockliffe, Ont	A.C	" 26	·10	Trace.	·12	3·0	326·8	258·8	68·0	Free	Suspicious.
56	Westboro, Ont	C.E.J.B	" 29	·02	·08	8·63	1650·0	6598·0	4188·0	2410·0	"	"
57	Avonmore, Ont	W.M.R	Oct. 2	·16	·14	Free.	12·0	419·2	291·2	128·0	F. trace	Contaminated.
58	Ailsa Craig, Ont	R.R.C.	" 7	7·62	·41	Free.	17·5	510·0	340·8	169·2	Trace	Seriously polluted.
59	Mather, Man	J.A.F., No. 1	" 7	2·22	·53	"	150·0	4261·8	3356·0	905·8	Free	Not potable.
60	" "	" " 2	" 7	·20	·12	1·65	20·0	1252·0	1108·0	144·0	"	Suspicious.
61	" "	" " 3	" 7	3·58	·23	Free.	1850·0	3875·0	3351·0	524·0	"	Not potable.
62	Rockliffe, Ont	A.C	" 9	·12	Free.	·14	3·5	332·8	281·6	51·2	Trace	Suspicious.
63	St. Héléne de Chester, Que	A.B	" 10	Free.	·53	Free.	5·5	62·4	26·4	36·0	Hy. trace	"
64	Caseleyville, Alta	J.J.W.	" 11	2·60	·04	Free.	12·5	4855·2	3487·2	1368·0	Free	Saline.
65	Elkhorn, Man	E.G.W	" 19	22·82	·07	1·24	9250·0	16190·0	15290·0	500·0	V.F. trace	Strongly saline.
66	Bonaccord, Alta	J.L.R.	" 23	Free.	·12	Free.	1·5	274·4	236·4	38·0	Free	Free from pollution.
67	Aylmer, Que	G.P.M.	" 26	·07	·04	·003	27·5	430·8	334·0	96·8	F. trace	Suspicious.
68	Rockliffe, Ont	A.C	" 27	·10	·01	·098	3·2	332·0	260·4	71·6	"	"
69	Metcalfe, Ont	R.A.G.	" 31	·68	·28	·91	100·0	640·0	480·0	160·0	Trace	Polluted.
70	Green Ridge, Man	Mrs. E. J. F.	" 31	14·52	·18	·57	4300·0	14302·4	6178·4	8124·0	Free	Saline.

71	Carp, Ont.	F.T.A.	Nov.	7	·12	·16	Free	480·0	1360·0	1216·0	144·0	Trace.	Seriously contaminated.
72	Norton, N.B.	N.C.	"	9	Trace.	·04	·36	32·5	270·0	240·0	30·0	Free.	Suspicious.
73	Truro, N.S.	C.P.M.	"	11	Free.	·10	Free.	9·0	118·4	60·0	58·4	F. trace.	Free from pollution.
74	Felton, Ont.	S.M.	"	16	·88	·04	"	175·0	1940·0	1575·0	365·0	Hy. trace.	Very suspicious.
75	Marathon, Ont.	D.H.W.	Dec.	2	·82	·11	"	210·0	1333·2	1184·8	148·4	"	Dangerously polluted.
76	Grand Bay, N.B.	Mrs. S. R.	"	2	Free.	·01	Trace.	7·5	37·6	21·2	16·4	Free.	Wholesome.
77	Blenheim, Ont.	G,W.M.	"	9	·86	Free.	Free.	450·0	1056·0	960·0	96·0	"	Polluted.
78	Grondines, Que.	O.M.	"	29	1·22	·25	"	190·0	956·8	866·8	90·0	"	Very suspicious.
79	Cantley, Que.	T.F.	Jan.	2	1·92	·10	"	500·0	1006·4	952·4	54·0	Trace.	Seriously polluted.
80	Ottawa, Ont.	J.C.T.	"	5	·30	·32	9·55	250·0	1722·4	1260·4	462·0	"	Polluted.
81	Norwood, Ont.	J.E.R.	"	10	8·00	·20	Free.	21000·0	45164·0	29988·8	15176·0	"	Strongly saline.
82	Ottawa S., Ont.	A.L.	"	11	Free.	·07	12·24	120·0	917·2	485·6	431·6	F. trace	Very suspicious.
83	Ways Mills, Que.	J.M.B.	"	25	"	·44	·25	Free.	168·0	103·0	65·0	Free.	Quite free from pollution.
84	Ironsides, Que.	A.T.D.	"	31	"	·05	14·5	160·0	601·6	368·8	232·8	Hy. trace.	Suspicious.
85	Keyes, Man.	A.B.	Feb.	15	·40	·26	Free.	1250·0	5261·2	3744·0	1517·2	Free.	"
86	Wauchope, Sask.	J.B.	Mar.	4	·10	·50	"	4·0	607·6	437·6	170·0	Hy. trace.	Free from pollution.
87	Arnprior, Ont.	R.J.S.	"	11	Trace.	Trace.	12·21	36·0	624·0	364·0	269·0	"	Polluted.
88	Camrose, Alta.	J.W.	"	27	Free.	·10	·11	52·0	904·0	840·8	63·2	Trace.	Free from pollution.
89	Carp, Ont.	W.D.J.	"	28	·08	·04	·14	26·0	395·2	305·2	90·0	"	Decidedly polluted.
90	Jacksonville, N.S.	R.M.J.	.	30	1·78	·45	Free.	30·0	152·8	82·8	72·0	"	Seriously "

REPORT OF THE DOMINION ENTOMOLOGIST

C. GORDON HEWITT, D.Sc.

OTTAWA, March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Department of Agriculture, Ottawa.

SIR,—I have the honour to submit herewith my third Annual Report of the work of the Division of Entomology, covering the year beginning April 1, 1911, and ending March 31, 1912. This report gives a summary of the more important work carried on during the above period and refers to the depredations of those insects which were unusually abundant and injurious and which received our attention.

In all the branches of the Division's activity, there has been a marked increase in the work, and its development along the various lines outlined in the subsequent account indicates the manner in which our work is affecting and proving of benefit to an increasing number of those engaged in agriculture, horticulture and forestry, and to the sanitarian who must consider insects as affecting the public health.

For the sake of convenience the report of our work may be considered under the following sections:—

1. The administration of the Destructive Insect and Pest Act, including—
   (*a*) Inspection and fumigation of imported nursery stock, etc.
   (*b*) Field work against the Brown-tail Moth.
2. Insects affecting field crops.
3. Insects affecting fruit crops.
4. Forest insects.
5. Insects affecting domestic animals and man.
6. Insects affecting garden and greenhouse.
7. Apiculture.
8. Miscellaneous.

1. ADMINISTRATION OF THE DESTRUCTIVE INSECT AND PEST ACT.

(*a*) THE INSPECTION AND FUMIGATION OF IMPORTED NURSERY STOCK.

With the opening up of the country, the extension of orcharding and horticulture and the growth of our cities there is naturally a concomitant annual increase in the numbers of trees and plants, classed as nursery stock, imported into Canada from foreign countries.

An additional fumigation house has been erected at the fumigation station at Niagara Falls to meet the increase in the importations.

The following table indicates the value of trees, plants and shrubs included in the term nursery stock and imported into Canada during the year ending March 31, 1911:—

United States	$44,828	Japan	$361
Holland	11,249	Russia	248
France	4,260	Denmark	180
British Isles	3,636	Australia	20
Belgium	2,036	China	16
Germany	1,148		
			$67,982

The different sources of our imported trees and plants are an indication of the risk which we run of having insect pests introduced by such means from the various countries. All nursery stock from countries other than European is fumigated before entry to prevent the introduction of San José Scale.

Nursery stock from Europe, Japan and the States of Maine, New Hampshire, Vermont, Massachusetts, Connecticut and Rhode Island is inspected either at the port of entry or at its destination. The following table gives a summary of the results of the inspection of imported stock during the season 1910-11, the season ending on May 15:—

Country of Origin.	Fruit Trees and Fruit Seedlings.	Ornamental Shrubs and Evergreens.	Greenhouse. Plants.
France	2,590,750	644,925	3,150
Holland	261,875	338,408	4,299
British Isles	98,533	73,754	484
Belgium	100	1,825	18,461
United States (six)		4,185	
Japan		2,672	
Germany		211	525
Total Fruits			2,951,253
Total Ornamentals			1,065,980
Total Greenhouse			27,075
Total number of plants inspected			4,044,313

Only a single nest of the Brown-tail Moth was discovered on French shipments during the inspection season of 1910-11 compared with 310 nests found during the importation season 1909-10. Two causes would appear to have contributed to this scarcity of Brown-tail Moth nests on the French nursery stock: first, the Brown-tail Moth was less abundant in the neighbourhood of the nurseries and secondly, there was greater care on the part of the French nurserymen. It is gratifying to be able to record that the President of the French Republic, on May 1, 1911, issued a decree establishing a department charged with the inspection of plants for insect pests and plant diseases, (*un service d'inspection phytopathologique*). This department will inspect nurseries and issue certificates. The French Minister of Agriculture has issued regulations which will insure the appointment of qualified inspectors. This is a source of no little pleasure as I feel it will not only be a powerful adjunct to our work of inspecting the imports when they arrive in Canada, but the issuing of reliable certificates will do much to redeem the character of the French inspection certificates, the issuing of which has been abused to so great an extent in the past that we have found in our inspection work as many as thirteen nests of the Brown-tail Moth in a case of French nursery stock bearing an inspection certificate duly signed, nor was this an isolated case.

In our work of inspecting and fumigating nursery stock we are frequently informed that shipments bear an inspection or fumigation certificate and it is accordingly assumed that they are exempt from fumigation or inspection. We do not at present accept the fumigation or inspection certificate of any country or state.

While the certificates of certain countries and states might be safely accepted there are others where such acceptance is impossible. This is especially the case where the nurseries are inspected only within a certain period and such a period is too long to guarantee the freedom of the nursery from certain insects. Further, the possibility of dishonest or careless nurserymen attaching fumigation certificates to nursery stock requiring fumigation under the laws of the country or state of origin is not always sufficiently safeguarded. At present we inspect every imported plant upon which such insects as for example the Brown-tail and Gipsy Moths might be introduced, and fumigate all plants upon which the San José Scale might be carried.

Owing to the fact that the province of British Columbia has powers under the Regulations issued under section 55 of the 'Agricultural Associations Act, 1911' of the Province of British Columbia to inspect and fumigate nursery stock imported into British Columbia, thereby carrying out the provisions of the Dominion Destructive Insect and Pest Act, an agreement has been made between the Dominion and Provincial Departments of Agricluture whereby the work of fumigating and inspecting nursery stock imported into Canada through the port of Vancouver will, in future, be carried out under the direction of the Provincial Inspector of Fruit Pests. So far as the carrying out of the requirements and regulations of the Dominion Destructive Insect and Pest Act is concerned the work is under the supervision of the Dominion Entomologist and at least one officer of the Dominion Division of Entomology will assist in the work and furnish monthly returns to this office. This agreement is very satisfactory and will prevent the possibility of any duplication in the future of the inspection and fumigation of nursery stock imported into British Columbia through Vancouver. The possession of similar powers in respect to the inspection and fumigation of imported stock has lead to duplication of the work in the past, but by the new arrangement this will be avoided in the future to the satisfaction of all concerned.

(*b*) FIELD WORK AGAINST THE BROWN-TAIL MOTH.

The most notable feature of the Brown-tail Moth work for the season ending in the Spring of 1911 was the discovery that the infestation had spread from the State of Maine into New Brunswick. Reference was made in my last Annual Report (*page 218*) to this fact, and nests were discovered over a considerable area. In November, 1911, Mr. J. D. Tothill, who was placed in charge of the field work in New Brunswick, began scouting the infested territory with a force of six inspectors, half of the force being employed by the provincial Department of Agriculture in accordance with our arrangement for co-operation in the work. Later during the present season (1911-12) however, the infested territory was found to be of so great an extent that the field force was increased to twelve men. As the seasons work will not be completed until May, the present report of the Brown-tail Moth work will refer, as in previous years, only to the work completed in May 1911; that is, for the season 1910-11. In connection with the New Brunswick work it may be noted that at the time of writing the infestation has now been found to have spread into seven counties, namely, Charlotte, Carleton, York, Sudbury, Queens, Kings and St. John. The result of this season's work will be included in my next annual report.

The work of scouting for and destroying the winter webs of the Brown-tail Moth in Nova Scotia from December 1910 to May 1911 was carried out by two parties, each consisting of three men, working under Mr. G. E. Sanders field officer of this Division, and Mr. H. G. Payne a provincial inspector, respectively. The following is a list of the localities and numbers of winter webs which were destroyed in the same during the season and indicates the degree of infestation for the period specified:

Kings County: Kingston	2	Digby County: Bear River	614
Annapolis County: Lawrencetown	6	Acacia Valley	1
W. Paradise	12	Marshalltown	1
Tupperville	1	Barton	18
Mochelle	7	Gilbert's Cove	2
Lequille	108	Melanson Settlement	6
Granville Centre	1	South Range	29
Clementsvale	1	Southville	643
Deep Brook	118	Riverdale	3
Paradise	11	Hillburn	16
Bridgetown	601	Concession	1
Carleton Corner	234	Church Point	1
Round Hill	268	Meteghan	1
Annapolis	2	Forest Glen	1
Granville Ferry	1	Woodstock	1
Upper Clements	2	Lower Meteghan	1
Digby County: Smiths Cove	18	Fort Point	2
Digby	3	Lower Saulnierville	2
Acaciaville	2	Meteghan River	3
Brighton	2	Lake George	1
Bloomfield	1	Beaver River	1
Ashmore	1	Yarmouth County: Carleton	5
Plympton	2	Ohio	1
Weymouth	1511	Hebron	1
Danvers	17	Deerfield	1
Hassett	1	Bloomfield	1

The total number of webs collected was 4,490 compared with 1,484 during the previous season (1909-10.)

The large infestation at Weymouth, where the caterpillars were found on low-growing wild rose bushes when I visited the locality in June, 1911, was due chiefly to two causes: primarily to the fact that a large pulp mill which worked day and night had attracted the female moths by the brilliant illumination during the flying season and secondarily to the fact that the locality had not been well scouted during the previous winter and the insects had increased in the locality. Several cases of 'Brown-tail rash,' caused by the poisoned hairs of the caterpillars, were reported.

The more seriously infested localities, such as Weymouth, Southville, Bear River, Bridgetown, etc., were sprayed with lead arsenate as soon as the scouting work was completed and the trees had finished blossoming. The caterpillars were then almost fully grown and an earlier spray, had it been possible, would have been still more effectual.

The following list indicates the number of webs found on the different species of food plants during the season 1910-11. The decided preference for apple is an important point to note.

Apple	3,829	Wild Rose	13
Thorn	207	Sweet cherry	11
Plum	146	Maple	8
Pear	106	Wild cherry	1
Wild Pear (Amelanchier)	28	Quince	1
Oak	20	Acacia	1
Elm	17	Beech	1
Barberry	1		

Mr. G. E. Sanders, in addition to directing the scouting work, carried on a number of experiments and made a number of observations on the Brown-tail Moth larvae. It was found that a considerable proportion of the winter webs dropped on to the ground during the winter, thereby escaping destruction. A series of experiments showed that when winter webs had been kept frozen in a solid block of ice for eight weeks, thirty per cent of the larvae emerged in an apparently healthy condition when the ice was melted and the webs dried. Counts were made of the number of hibernating larvæ at the end of the winter. In the course of the work a winter web on apple was found to contain 1,852 young caterpillars. These observations are being continued during the present season both in Nova Scotia and in New Brunswick.

Through the kindness of Dr. L. O. Howard, Entomologist to the United States Department of Agriculture, we were enabled to commence importing parasites of the Brown-tail Moth. These parasites the United States Department of Agriculture and the State of Massachusetts have at enormous expense imported from Europe and have succeeded in establishing in the New England States. Several hundred puparia of a tachinid, *Compsilura concinnata* Meigen–a two-winged fly–parasitic on both the Gipsy and Brown-tail Moths, were placed in the neighbourhood of St. Stephen, N.B. The absence of proper facilities in the way of a field laboratory for carrying on the work, however, prevented us from attempting any further work during 1911. Arrangements are now being made for the establishment of a field laboratory in New Brunswick where the work of breeding and colonizing the parasitic and predaceous enemies of the Brown-tail Moth will be carried on and Dr. Howard has expressed his willingness to supply us with material from Massachusetts for which co-operation we are most deeply indebted. Not only is the Brown-tail Moth spreading northward along the Atlantic coast in increasing numbers, but the Gipsy Moth is also advancing towards our frontier and it will be only a question of time before it also invades Canada. On the latter account and also in view of the comparatively light infestation of the Brown-tail Moth it is of the greatest importance that we should take steps towards establishing the natural means of control, namely parasitic insects and fungal disease which are the only means by which ultimate control of these pests will be gained. It has been found that certain of the enemies of the Brown-tail Moth and Gipsy Moth such as the predaceous beetle *Calosoma sycophanta*, the tachinid parasite *Compsilura concinnata* and the chalcid parasite *Monodontomerus aereus* and others which have been imported from Europe and Asia will attack certain of our native insects. We hope, therefore, to establish certain of these enemies of the Brown-tail and Gipsy Moths in New Brunswick on the native insects in order that they will be present and able to turn their attention later to the Brown-tail and Gipsy Moths. Thereby we shall be more prepared when the infestation increases in abundance, as it undoubtedly will.

2. INSECTS ATTACKING FIELD CROPS.

The following were the more important of the insects affecting field crops, including roots and vegetables, which were reported to the Division or were subject of investigation. In addition we received an increasing number of inquiries relating to many other species.

CUTWORMS.

Throughout Canada, from Nova Scotia to British Columbia, injuries from cutworms were reported. In Saskatchewan and Alberta cutworms were unusually abundant and destructive in certain sections destroying not only roots, vegetables and garden crops but also grain crops to a serious extent. One of the worst reports was received from a correspondent at Monarch, Alta., who on June 21 wrote: 'Cutworms have been seriously destructive to my wheat crop. During the past six weeks 320 acres have been destroyed by these pests, summer fallow land in the best of condition. Alongside of this 200 acres of stubble land has also been destroyed.' It was found that the larvae of *Porosagrotis delorata* Sm. were responsible for the latter injury. This was the first record of the species as an injurious cutworm. The Redback cutworm *Euxoa ochrogaster* Gn. was one of the chief destructive species.

On account of the serious and widespread losses resulting from cutworm injuries, Mr. Arthur Gibson, Chief Assistant Entomologist, who for many years has made a special study of this group, has prepared an illustrated bulletin, which is now in the press, describing the various species of cutworms and army-worms and the methods of prevention and control.

CHINCH BUG (*Blissis leucopterus* Say.)

Although we have isolated records of the occurrence of this pest it has not been reported as seriously injurious in Canada, with the possible exception of an outbreak in Welland county, Ont., in 1908 when it injured late oats, until last summer (1911), when it was found seriously injuring timothy meadows in Middlesex county, Ont. Extensive damage was done in what appeared to be the centre of the infestation, blocks of grass several yards square being entirely killed out. As this is undoubtedly the most injurious insect affecting staple grains in North America, it is intended to make a careful investigation of the present outbreak with a view to preventing the spread of the insect to other sections.

THRIPS.

Reference was made in my report for 1910 to the widespread and, in some places, serious damage to cereals, particularly oats, by thrips, the sterile ears caused by their injury producing a characteristic 'silver top' appearance. Investigations on this insect were begun on the experimental seed plots of the Central Experimental Farm. A species of thrips was found and Dr. W. E. Hinds kindly confirmed my identification of this as the Grass Thrips, *Anaphothrips striatus* Osborn. A second species, *Euthrips nervosus* Uzel, was also found. A brief account of the first season's work on this species has been published (*Forty-Second Annual Report, Ent. Soc. of Ontario, 1900, pp. 63-65*). The blighted appearance is due to the larvæ and adult insects producing sterility in the ears by feeding on the flowers and ovaries. These injuries take place while the inflorescence is still in the leaf sheath. Counts were made of the ears rendered sterile by the thrips injuries. The most seriously injured variety of oats of those examined was 'Banner M'; nineteen heads of this variety had an average of 36·3 per cent of sterile ears. The least attacked was 'Abundance, Garton's Regenerated'; eleven heads of this gave an average of 17·3 per cent sterile ears. The maximum percentage of sterile ears in all the heads examined was 56·8 per cent in a head of 'Banner M.' The minimum percentage was found in a head of 'Banner H,' of which 3·5 per cent were sterile. The significance of these figures, as indicating the loss in the aggregate yield caused by the thrips, will be appreciated.

ROOT MAGGOTS.

From New Brunswick, Ontario and British Columbia reports were received concerning injuries of a serious nature, those of the Cabbage Root Maggot being the most common. Our experiments to test the efficacy of the various preventive measures were continued. On radishes the following substances were tried: Carbolic and soap emulsion, dry pyrethrum, dry pyrethum and flour, pyrethum decoction, dry hellebore, hellebore decoction. The same substances were used on onions and nitrate of soda was also tried in addition. The following preventives were tried on cabbages and cauliflowers: tarred felt-paper cards, carbolic and soap emulsion, dry hellebore, hellebore decoction, dry pyrethrum, pyrethrum and flour. In the case of cabbages and cauliflowers the season's experiments again showed the superiority of the tarred felt-paper discs over other preventives and in the case of radishes and onions the hellebore decoction using two ounces of hellebore to one gallon of water and watering the plants every seven or ten days, proved the most effective of the protective measures which were tried. Our experiments will be continued again during the coming summer and it is intended to collate the work of the several years for publication.

COLORADO POTATO BEETLE.

It is of interest to record that this insect, which a recent inquiry of the Commission of Conservation indicated as being the most widespread and destructive of farm pests, was attacked in Ontario during 1911 by a Pentatomid, *Perillus bioculatus* var, *claudus*.

3. INSECTS ATTACKING FRUIT TREES.

All of the more common fruit insects were again the subject of enquiries. It is most gratifying to note, however, that the increasing attention which is being given to spraying, resulting in the more common use of efficient power sprayers and the adoption of system in the application of spray solutions, is bringing about a very great improvement in certain sections.

Oyster-shell Scale (*Lepidosaphes ulmi*) is being controlled by lime-sulphur applied before the buds burst and while the trees are still dormant. Careful spraying is resulting in the production of apples of which 99 per cent are free from Codling Moth. The Bud Moth (*Tmetocera ocellana*) was responsible for considerable damage in Nova Scotia, New Brunswick, Quebec and Ontario. The absence of reliable data concerning this pest is responsible for much divergence in opinions as to the methods of control. On this account it is planned to commence studies of the life-history and control measures in eastern Canada during the coming season.

Through the co-operation of the Department of Agriculture of Ontario we were given a room in the Jordan Harbour Experiment Station which was used as a field laboratory, and Mr. R. C. Treherne made observations on a number of the more important fruit pests in the district. A brief report of the work has been published in the Annual Report of the Entomological Society of Ontario for 1911. Mr. Treherne found among other things that the Plum Curculio (*Conotrachelus nenuphar*) was responsible for a considerable dropping of both apples and plums and while its attacks might be of some benefit by causing a thinning out of the fruit, this thinning out would appear to be in excess of the requirements. In the first week in July, before the development of the second brood of the Codling Moth, 3,300 apples (on the trees) were examined by Mr. Treherne in the district between Jordan and St. Catharines, Ont., 15·06 per cent were found to be infested with the Curculio and 7·99 per cent were attacked by the Codling Moth. In the Ridgeway and Fort Erie districts out of 3,100 fruits; 6·8 per cent were infested with the Curculio and 7·4 per cent with Codling Moth.

In Nova Scotia and also in Ontario, the Green Fruit Worms (*Xylina* spp.) were destructive to the growing apples. Reports of injuries to apples by Capsid bugs were received from Ontario, Quebec and British Columbia. These insects attack the apples when they are small and their punctures retard the development of the fruit with the result that the apples bear marked depressions.

The Palmer Worm (*Ypsolophus pomotellus* Harris) was reported by Mr. L. Caesar from Ontario. The sporadic occurrence of this orchard pest, which has sometimes proved very serious, makes its record desirable.

In New Brunswick, Quebec and some sections of Ontario the Apple Maggot or Railroad Worm (*Rhagoletis pomonella*) was more than usually destructive where no steps were taken to control it by picking the fallen fruit. Mr. W. A. Ross, one of our field officers, commenced, while in the employ of the Ontario Department of Agriculture, a study of this pest and it is intended that he shall continue his studies during the coming summer when he will be located at our field station at Jordan Harbour, Ont.

Tent caterpillars, both the Forest Tent Caterpillar (*Malacosoma disstria*) and the American Tent Caterpillar (*M. americana*) were unusually abundant and destructive in New Brunswick, Quebec, Ontario and British Columbia. In orchards where the owners had not destroyed the newly formed webs or sprayed, the trees were entirely stripped, but their defoliation of orchards, however, was slight compared with the enormous devastation they affected on shade and forest trees. There did not appear to be any evidence of disease, nor were parasitic insects observed at work on the caterpillars. A number of the egg masses were collected in July by Mr. G. E.

Sanders but only a small percentage were found to be parasitised by such egg parasites as *Telenomus* spp. and *Pentarthron minutum*. At the present time the characteristic egg masses are abnormally abundant on the trees and everything points to an even more serious outbreak during the coming summer.

During the past two years we have found that larvæ of *Oberea tripunctata* have inflicted noticeable injuries to the twigs of apple in New Brunswick, the damage being quite conspicuous in some orchards.

INDIAN ORCHARDS.

An increase in the appropriation voted for the work in the Indian orchards by the Department of Indian Affairs, on whose behalf the care of the orchards in the Indian Reservations in British Columbia is undertaken, enabled us to employ our officer Mr. Tom Wilson in this work during the whole year. In previous years he was employed only from May to September inclusive and was unable, therefore, to carry on important and necessary work during the other months of the year. During the past year he devoted his whole time to the work, Mr. R. C. Treherne having been given charge of the inspection and fumigation of nursery stock imported into Canada *via* Vancouver. We were also enabled to supply a number of additional spray pumps for use in reserves hitherto without them or dependent upon other reserves for them. As a full report of the work will appear in the Annual Report of the Department of Indian Affairs, it is unnecessary to submit an additional report herewith.

4. INSECTS AFFECTING FOREST AND SHADE TREES.

The increasing attention which is being paid to insects injurious to shade and more especially forest trees in Canada was indicated by the increase in the number of enquiries addressed to the Division concerning them. Investigations on two of the most important forest insects, both defoliators were continued; tho following are brief accounts of the same.

THE SPRUCE BUDWORM (*Tortrix fumiferana*).

As stated in my last annual report, arrangements were made for a study of the natural parasites of the species, with a view to foretelling, if possible, in conjunction with our field studies, the probable results of the outbreak which had assumed serious proportions in Quebec. Arrangements were made for supplies of spruce and balsam infested with the caterpillars to be sent to the Division from different regions in Quebec and British Columbia, and we are indebted to Mr. G. C. Piché, Chief Forestry Engineer of the Province of Quebec and to many lumber companies and private individuals for their assistance and co-operation in this matter and in sending in reports as to the depredations of the caterpillars. Mr. Sanders had charge of the breeding out of the parasites and the season's work had very valuable and interesting results. A number of new species of parasites were bred out of the material and descriptions have been published of the following species: a tachinid, *Winthemia fumiferanæ*, n. sp. (described by Mr. Tothill in *Can. Ent. Vol. 44, pp. 2-3*); six ichneumons, *Apanteles fumiferanæ*; n. sp.; *Conoblasta, fumiferanæ*, n. sp.; *Phygadeuon plesius*, n. sp.; *Epiurus innominatus*, n. sp.; *Mesochrorus diversicolor*, n. sp.; these have been described by Mr. H. L. Viereck of the United States Bureau of Entomology in *Proc. United States National Museum, Vol. 42, pp. 139-150.* There are, in addition, certain species whose identity is not certain. The results of our investigations, which will be subsequently published in full in the account of this insect, combined with observations in the field indicated that the extent and

intensity of the attack of the native parasites were such that the pest was being controlled in certain regions and would be controlled in others. Of all the parasites, those attacking the insect in the egg stage, the minute egg parasite *Penarthron minutum* was the most interesting and apparently the most effective. In a lot of eggs collected near Ottawa, 77 per cent of the eggs were parasitised and they contained an average number of over two parasites per egg. In 33 egg masses there were 370 eggs, 286 of these eggs were parasitised and produced 639 adult parasites. Similar heavy infestations of egg parasites were found in eggs collected at Maniwaki, P.Q.; 93 egg masses contained 1,192 eggs of which 902 or 75·6 per cent were parasitised, 2,167 parasites emerged or an average of 2·4 parasites per egg. With such a degree of egg parasitism natural control would appear to be assured, as it actually proved to be. In addition, the percentage of the larger ichneumon and other parasites was considerable. The devastation of the Spruce Budworm is spreading in an easterly direction and large numbers of anxious enquiries were addressed to the Division by lumber companies and private owners. As a result of our investigations on the parasites, we were able to give the assurance that the pest was becoming controlled before it had accomplished the destruction which was feared, and at our request a statement to that effect was issued to the press by the Commission of Conservation.

THE LARCH SAWFLY (*Nematus erichsonii*).

We have continued our studies of the parasites, both European and North American species, of this most destructive enemy of the native larch or tamarack. In view of the effective manner in which the parasites and other natural means of control are able to gain control of outbreaks of this species in Europe, particularly in England at the present time, attempts are being made to import from England the useful parasites and establish them in Canada, where as yet the native parasites affecting this species do not seem to be sufficiently numerous to obtain control before the insects' repeated depredations are fatal to the trees. As stated in my last report arrangements were made for the importation of cocoons of the sawfly from a locality in the English Lake district where the parasites had been abundant and effectual. The most abundant of these parasites and apparently the most important was an ichneumon which, since I first recorded it in 1908, has been referred to in all my writings, and by all those who have quoted the same, as *Mesoleius aulicus* Grav. Further study on the part of Mr. Claude Morley, an English authority on the British Ichneumons, has shown that this is a new species and the name *Mesoleius tenthredinis* has been given to it by Mr. Morley. Through the co-operation of the Manchester City Corporation Waterworks Committee, who own the Thirlmere estate in Cumberland, upon which the Larch Sawfly is being controlled by its natural enemies, we were enabled to have collected and sent to the Division a supply of cocoons from the locality in which 65 per cent of the cocoons had been infested with parasites in 1910. These cocoons were distributed in the following places: near Quebec City by Mr. G. C. Piché; at Point Platon, Que., by the late Mons. E. G. Joly de Lotbinière; in Algonquin Park, Ont., by the Superintendent, Mr. G. Bartlett, and at Ste. Agathe des Monts, Que. A small lot of cocoons was retained in the Division for study and a further batch was sent to Prof. R. H. Pettit, State Entomologist of Michigan. The disappearance of the sawflies in the locality in which the cocoons were collected had resulted in a considerable falling off in the percentage of cocoons infested with the ichneumon, *Mesoleius tenthredinis*. The cocoons retained in Ottawa showed a parasitism of 12·5 per cent and Prof. Pettit found that 7·05 per cent of the cocoons sent to him contained this parasite.

As the increase in the parasites and natural enemies of the sawfly is the only means whereby control of the pest will be gained, it is important that this increase should be obtained by such means as are possible. With a view to obtaining a larger

supply of the European parasites, particularly the ichneumon, *Mesoleius tenthredinis*. I visited the English Lake District in January, 1912, and succeeded in finding a locality where an examination of the hibernating larvæ indicated that a fairly high percentage of the sawfly larvæ were parasitised; from thirty to forty per cent of the larvæ appeared to contain the half-grown larvæ of the ichneumon parasite. Through the kindness of the owner of this locality, Sir William Ascroft, I was able to make arrangements for the collection of the infested cocoons. The collection of the cocoons was superintended by Mr. A. W. B. Edwards, Forester of the Manchester City Corporation Waterworks Committee, the chairman of which committee, Sir Bosdin T. Leech, most kindly assisted us in this work and for this help I wish to express our great indebtedness. I am now informed that, although the season has been unusually wet, ten seven-pound biscuit boxes of cocoons are being shipped to us. On their arrival they will be taken to the Riding Mountain Forest Reserve in Manitoba by Mr. Swaine, who will superintend their distribution in this reserve which marks the present western boundary of the spread of the insect. On account of the difficult conditions under which we are carrying on this work and the enormous extent of the infestation, covering as it does over 450,000 square miles, immediate results or even results appreciable for many years cannot, with the greatest optimism, be expected. We do know with certainty, however, that we are endeavouring to augment the only means by which control of this most serious enemy of the larch will be gained.

The Birch Leaf-Mining Sawfly (*Phlebatrophia mathesoni* Macgilliv.), which was referred to in my report for 1909-10 was extremely abundant in Nova Scotia and New Brunswick, but especially in the former province where the birch trees had the usual brown and withered appearance. In the same provinces and in eastern Canada generally the Larch Case-bearer (*Coleophora laricella*) was increasingly injurious; in some sections in Nova Scotia the larch trees or tamaracks over considerable areas had their leaves entirely destroyed and presented the characteristic light-brown appearance. The Bronze Birch Borer (*Agrilus anxius*) is continuing its destructive spread and is to be found now from Nova Scotia westward to Manitoba. It is particularly injurious to ornamental birches, especially the cut-leaved variety. Once it is noticed that a tree is attacked it is impossible to save it, as the boring larvæ have, by that time, spread through the wood of the branches, in some of which their presence may not be noticed externally. I regret to say that practically all the ornamental birches on the Central Experimental Farm are attacked and are now being killed and cut down one by one. The Maple Leaf-Cutter (*Paraclemensia acerifolliella* Fitch), whose appearance is somewhat sporadic, was prevalent in and reported from Quebec and Ontario. This species is readily distinguished by the characteristic circular and oval holes which the small caterpillars make by cutting pieces out of the leaves to form flat shelters. The Willow-leaf Beetle (*Galerucella decora*) was frequently reported from Manitoba injuring poplars and willows and occurred in enormous numbers in certain localities. Mr. Norman Criddle reported the beetles as being so numerous that the aspen poplars were actually bent down with the weight of the beetles upon them, and from a short distance whole bushes had a spotted grey appearance. An unusual outbreak of a geometrid, the caterpillar of which defoliated many thousands of acres of balsam in Newfoundland was reported to us by the Deputy Minister of Agriculture and Mines for that colony, and on investigation it was found that the insect was *Therina fiscellaria*, the caterpiller of which is one of the group generally known as 'span worms' or 'measuring worms.' The insect appeared to confine its attention to the balsam and the defoliated trees had a red appearance, apparently not unlike the depredations of the Spruce Budworm.

5. INSECTS AFFECTING DOMESTIC ANIMALS AND MAN.

Ticks.—The study of both our native ticks and those which are being introduced into Canada was continued. In these investigations we are particularly indebted to those veterinary inspectors of the department who are sending us specimens of such ticks as they may find in the course of their studies. Mr. J. W. Cockle, of Kaslo, B.C., has been indefatigable in his endeavours to send us specimens.

In view of the occurrence of the Rocky Mountain Spotted Fever Tick (*Dermacentor venustus* Bks.), in the States of Washington, Idaho, Montana, and other neighbouring States, where it has been shown to be the carrier of the organism of the Rocky Mountain Spotted Fever, an inquiry is being made as to its distribution in Canada. A single record of its occurrence at Kaslo, B.C., existed. A circular letter was sent out to western veterinary inspectors and secretaries of Farmers Institutes as a result of which we are now receiving specimens of ticks from different localities. We have found that *D. venustus* is fairly common in southern British Columbia and also that it is being brought in from Washington on imported live stock. This investigation is now in progress.

Sheep Maggots.—In certain regions in Europe the larvæ or maggots of the genus of flies known as *Lucilia* and also *Calliphora* are the cause of considerable injuries to sheep. A number of species of these flies occur in Canada and in order to discover whether their larvae were responsible for injuries to sheep an article was written on the subject and sent to the sheep breeders in Canada together with certain questions. The paucity of replies would indicate that sheep maggots are not a noticeable pest of sheep in Canada. This is due, I believe, to climatic conditions being unsuitable.

Warbles and Bots.—The account of the warble fly (*Hypoderma lineata*) published in my last report was responsible for a number of inquiries and a stimulating of interests in these pests and their control. Specimens of the Horse Bot (*Gastrophilus equi*) were received from Castor, Alta., and Moosejaw, Sask. Bot larvæ from deer were also received from British Columbia.

House Flies.—An important experiment on the range of flight of flies was carried out. This was in connection with an investigation which the Local Government Board of the British Government is carrying on on flies as carriers of infection and the results are being published. (*Rep. to the Local Government Board on Public Health and Medical Subjects. New series No. 66.*) The possible range of flight of flies is an important consideration in relation to the question of the possibility of their carrying disease germs and the proximity of their breeding places to human habitations. Flies which were reared in the laboratory were marked by means of an alcoholic solution of rosalic acid, a method of marking devised by Mr. G. E. Sanders who carried out the experiments. These flies were liberated on Porter's Island, an island in the Rideau river and in the centre of a well inhabited section of the city of Ottawa. Throughout the surrounding section of the city 'Tanglefoot' fly papers were distributed and afterwards collected and treated with a dilute alkaline solution which produced a brilliant red colouration from marked flies which were captured. Owing to numerous and in some cases extensive breeding grounds of house flies in the district flies were extremely abundant, which abundance naturally reduced the chances of marked flies being caught on fly-papers. Nearly 14,000 marked flies were liberated and 172 were recovered at various distances from the point of liberation. The furthest point at which a marked fly was captured was 700 yards (in a straight line) from the point of liberation. A full account of this investigation and also one which I carried out on the Lesser House-fly (*Fannia canicularis*) and the Latrine Fly (*F. scalaris*) is being given in the report already mentioned.

6. INSECTS AFFECTING GARDEN AND GREEN-HOUSE.

Beyond the insects concerning which inquiries are made year after year no exceptional records are to be noted and no special investigations on these insects were made. The Greenhouse Leaf-tyer (*Phlyctaenia ferrugalis*) was very injurious in certain sections to such plants as azalea, cyclamen and canna. The Black Vine weevil (*Otiorynchus sulcatus*) was responsible for considerable losses in certain greenhouses at Montreal, being particularly injurious to cyclamens. The Grape Vine Leaf-hopper (*Typhlocyba comes*) commonly wrongly called 'Thrips,' was again extremely injurious to Virginia Creeper and many inquiries were received concerning its control. Cutworms, the Tarnished Plant bug and Destructive Pea Aphis were all reported as injuring garden crops.

7. APICULTURE.

With a view to increasing the number of bee keepers in Canada and of assisting those who are desirous of beginning bee-keeping, a bulletin on apiculture has been prepared and, it is hoped, will be published shortly. As the most serious question affecting bee-keeping in Canada to-day is the spread of Foul Brood, this disease has been fully described and illustrated and the methods of treatment given in the bulletin. The provinces of Ontario, Quebec and British Columbia have legislation with a view to preventing the spread of Foul Brood within their territories and are endeavouring by means of apiary inspectors to deal with the situation. In British Columbia no foul brood exists, so far as can be ascertained at present, and it is to be hoped that its introduction will be prevented. A serious danger exists, however, in the possibility of the disease being introduced into the prairie provinces in colonies imported either from eastern Canada or from the United States, as Foul Brood occurs in all the States of the Union adjoining the international boundary; honey is also a serious means of introducing infection.

The Apiary.—The following is a report on the apiary which was managed by Mr. J. I. Beaulne.

Twenty colonies were removed from the bee cellar and placed on their summer stands on April 10 and 11. Their average weight when put into winter quarters in 1910 was 49½ lbs. and when brought out in the Spring of 1911 was 36 lbs., the average loss per colony being 12½ pounds.

Owing to the severe drought which began early in July the honey crop was not good. The dry weather and its serious effects on honey producing plants was generally responsible for a shortage in the crop with a consequent increase in the price of honey. The total amount of surplus taken from the bees during the season 1911 was 984 lbs., the yield of ten hives. These hives, therefore, gave an average yield of 84 lbs., which was satisfactory under the adverse circumstances.

Thirty colonies were carried into winter quarters on November 13, 1911, the average weight of the colonies being 47 lbs. At the time of writing the bees are wintering well.

8. MISCELLANEOUS.

Collections.—As usual we have named a large number of collections of insects for private individuals and teaching institutions, full use is therefore, being made of the collection of insects in the Division. It is our aim that this collection shall ultimately become a national collection of the insects of Canada, for such it is virtually at present. During the last year the arrangement of several of the orders

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The Insectary, Central Farm.

has been started; the Lepidoptera are now almost in order and progress will be made with the other orders as opportunity and accommodation permit. It gives me great pleasure to acknowledge our indebtedness to Dr. L. O. Howard, Chief of the United States Bureau of Entomology and his scientific assistants in the Bureau and in the National Museum at Washington for their continued assistance in naming entomological material for us; to all other specialists who have assisted us in a similar manner I wish to extend our most cordial thanks.

Exhibits of injurious insects have been sent to Provincial exhibitions at St. John, N.B., and Quebec. By request a special exhibit illustrating the relation of house-flies to public health was made at the Canadian National Exhibition at Toronto in September and the same was exhibited later at the Central Canada Exhibition, Ottawa. Lack of space prevents the arranging in the Division of a permanent public exhibit of injurious and useful insects which would render our collections increasingly useful to farmers and the public generally. It is hoped, however, that this may be remedied in the near future.

Correspondence.—The number of letters received from April 1, 1911, to March 31, 1912, was 3,993, and the number of letters sent out during the same period was 5,465, compared with 2,476 letters received and 3,845 sent out during the previous fiscal year.

Travelling.—The following is a brief account of the journeys which were made by me during the year in connection with the work of the Division. On April 12 I left for Washington, D.C., and remained there until April 19 studying the organization and methods of work in the Bureau of Entomology of the U. S. Department of Agriculture. The extent of their operations and investigations may be gathered from the fact that the appropriation for the Bureau of Entomology for the fiscal year 1911-12, was $601,920. The great kindness which Dr. Howard and his associates extended to me and the large amount of information which I was able to collect made my visit not only of extreme value but most enjoyable. I returned to Ottawa by way of Boston, where I visited the Gipsy Moth Parasite Laboratory at Melrose Highlands for the purpose of discussing the parasitic work and the possibilities of importing parasites of the Brown-tail Moth into Canada. I reached Ottawa on April 24. On April 28, I visited London, Ont., where I gave an illustrated address to the Women's Canadian Club on 'House-flies in relation to Public Health.' A number of addresses on the same subject were delivered in Ottawa. The educational work on the dangers of the house-fly and its control which has been carried on during the last two years is now resulting in active steps being taken to control the pest in many of our cities. On May 30, I left Ottawa for Nova Scotia and inspected the work which was being carried on against the Brown-tail Moth, going as far west in the province as Weymouth. I returned to Ottawa on June 8. Two visits were made to Toronto in August and September, on the latter occasion to give an address at the Canadian National Exhibition. New Brunswick was visited in September, leaving Ottawa on September 10. I reached Fredericton, N.B., on the 11th and conferred with the Provincial Department of Agriculture in reference to the Brown-tail Moth and other work. The next two days were spent visiting the infested territory in Charlotte County. On September 14 I visited St. John, N.B., and crossed to Nova Scotia on the 15th, returning to Ottawa via Truro, N.S. On November 8 by invitation of the Department of Agriculture of Quebec I addressed the Quebec Bee-keepers Association at Montreal on 'Bee Diseases and their Treatment.' The meetings of the Fruit Growers' Association and Bee-keepers' Association of Ontario were attended at Toronto on November 15 and 16, and addresses were delivered at each. The annual meeting of the Entomological Society of Ontario was held at Guelph on November 23 and 24, where I gave the public address and read one or two papers; Mr. Gibson also attended the meetings and contributed papers. On December 13

I left Ottawa for England, sailing from Halifax on December 16. During my visit to England I conferred with Mr. Guy Marshall, Scientific Secretary of the Entomological Research Committee of the Colonial Office (Dec. 29), Dr. Stewart MacDougall, Edinburgh University, Entomological advisor to the Board of Agriculture, and Dr. Shipley, Master of Christs College, Cambridge, in reference to a scheme which the Right Hon. the Secretary of State for the Colonies had submitted for our consideration, in reference to Imperial co-operation for the purpose of preventing the spread of insect pests within the Empire. A conference was held at the Colonial Office on January 17 when the proposed scheme was outlined to me. On January 16 and again on January 23 conferences were held at the Board of Agriculture, when the question of legislation governing the inspection of nursery stock and the inspection of English nurseries exporting stock to Canada were discussed with Mr. T. H. Middleton, Asst. Secretary, and Mr. A. G. L. Rogers. I also had the pleasure of discussing these and other matters with the President of the Board of Agriculture on January 23. I am pleased to say that the Board of Agriculture have arranged for the inspection of English nurseries and for the issuing of nursery certificates. I spent January 3 to 8 in the English Lake District seeking a suitable locality for the collection of cocoons of the Larch Sawfly containing parasites, to which work I have already referred. I conferred with Sir Bosdin Leech, the Chairman of the Manchester Waterworks Committee, which owns the Thirlmere Estate, on January 2 and he most kindly promised his co-operation in the matter of collecting and shipping the parasitised cocoons. Two lectures were also delivered in England on January 9 and 24. I sailed from Liverpool on January 26 and reached Ottawa on February 5, by way of Halifax, where the Brown-tail Moth work was discussed with Mr. Sanders and Prof. Cumming. The meetings of the Canadian Forestry Association were attended on February 7 and 8 and a short address on our work was given. The Dominion Fruit Convention held in Ottawa February 14-16 was attended. On March 22 I gave an illustrated lecture on Forest Insects at Queens University, Kingston, Ont., and also delivered an address (illustrated) at the annual meeting of the Quebec Society for the Protection of Plants held at Macdonald College, Que., on March 27.

Publications.—The following is a list of papers, articles, etc., written by the officers of this Division and published during the year 1911:—

C. Gordon Hewitt—

'Warbles on Cattle.' *Census and Statistics Monthly, Dept. of Agriculture, Canada, Vol. 4, pp. 118-119.*—1911.

'The more Injurious Insects of the Year 1910.' *Forty-first Ann. Rep. Ent. Soc. Ont., pp. 27-29.*

'Some Observations on the Practical Importance of Parasitic Insects.' *Forty-first Ann. Rep. Ent. Soc. of Ont., pp. 62-64.*—1911.

'Notes on Insect Pests—The June Beetle and Tent Caterpillars.' *Census and Statistics Monthly, Dept. Agr., Canada, Vol. 4, pp. 146-148.*—1911.

'The House-fly in Relation to Public Health.' *Public Health Journal, Vol. 2, pp. 259-261.*—1911

'The Destructitve Insect and Pest Act and Regulations issued thereunder.' *Div. Ent. Bull. No. 1. Bull. No. 7, Second Series, Experimental Farms, Dept. Agriculture, Canada.*—1911.

'The Spruce Budworm and Larch Sawfly.' *Rep. Canadian Forestry Ass., pp. 107-113. 1 map.* 1911.

'The Preparation of a Catalogue of the Insects of Canada.' *Canadian Entomologist, Vol. 43, pp. 273-275.*—1911.

'The Teaching of Insect Life and its Practical Importance.' *Ottawa Naturalist, Vol. 25, pp. 63-67.*—1911.

'The Hessian Fly.' *Census and Statistics Monthly, Vol 14, pp. 201-203.*—1911.

'On *Coelopisthia nematicida* Pack. A chalcid parasite of the Large Larch Sawfly, *Lygaeonematus erichsonii* Hartig.' *Canadian Entomologist, Vol. 43, pp. 297-303, 4 figs.*—1911.

'The Chinch Bug.' *Census and Statistics Monthly, Vol. 4, pp. 231-233.*—1911.

'Daniel William Coquillet' and other reviews in the *Canadian Entomologist, Vol. 43.*

'The Sheep Maggot Fly.' *Census and Statistics Monthly, Vol. 4, pp. 323-324.*

'Report of the Dominion Entomologist.' *Ann. Rep. Experimental Farms, Dept. of Agriculture, Canada, pp. 207-235, 3 figs; 3 pls.*

ARTHUR GIBSON—

'The Preparatory Stages of *Phragmatobia assimilans*, var. *franconia* Sloss.' *Can. Ent., Vol. 43, pp. 125-128.*—1911.

'Insects of the Year in the Ottawa District.' *Forty-first Ann. Rep. Ent. Soc. Ont., pp. 11-15.*—1911.

'Basswood or Linden Insects, IV.' *Forty-first Ann. Rep. Ent. Soc. Ont., pp. 99-101.*—1911.

'The Entomological Record for 1910.' *Forty-first Ann. Rep. Ent. Soc. Ont., pp. 101-120.*—1911.

'Studies on the Life-histories of Canadian Noctuidæ: I. *Monima revicta.*' *Can. Ent., Vol. 43, pp. 157-159.*—1911.

'Some Seed-infesting Insects.' *Ont. Agric. College Review, May, 1911, 3 pp.*

'Two Classes of Injurious Insects: Cutworms and Plant Lice.' *Ottawa Horticulturist, May, 1911.*

'The Luna Moth.' *Ottawa Naturalist, Vol. 25, pp. 81-83.*—1911.

'Fauna Ottawaensis: Order Lepidoptera, Super-family Geometroidea.' *Ottawa Naturalist, Vol. 25, pp. 105-112.*—1911.

'Abundance of the Cotton Moth in Ontario.' *Ottawa Naturalist, Vol. XXV., Dec.*—1911.

R. C. TREHERNE—

'Insects of the Year in the Niagara District.' *Forty-first Ann. Rep. Ent. Soc. Ont., pp. 19-21.*—1911.

G. E. SANDERS—

'Notes on the Breeding of *Tropidopria conica* Fabr.' *Can. Ent., Vol. 43, pp. 48-50, 1 fig.*—1911.

Library.—By exchange and purchase we have increased the number of entomological and agricultural journals and publications. I wish especially to thank the Hon. Walter Rothschild for '*Novitates Zoologicae.*' We are also indebted to the respective institutions for the following publications which have been added during the year: *Arkiv fur Zoologi; Reports Michigan Academy of Science; Bulletin of the Wisconsin Natural History Society.* To all those institutions and individuals who have exchanged publications with us our sincere thanks are due. The library is still sadly deficient in a number of standard works on systematic entomology and we are obtaining these as our funds permit. A complete library is essential to the best work.

STAFF.

The great increase in the work of the Division and more especially the urgent need for further extension of the study and control of injurious insects in Canada has led to a number of important additions to the staff of the Division during the past year.

Mr. J. M. Swaine, M.Sc., has been appointed Assistant Entomologist to take charge of forest insects. Mr. Swaine is a native of Nova Scotia and after studying at the Provincial Agricultural College, Truro, N.S., he was employed for several years in teaching. His entomological inclinations took him to Cornell University, Ithaca, where he specialized in entomology and graduated (B.S.A.) in 1905. In the following year he obtained his degree of Master of Science and continued his post graduate studies on the staff of the Entomological Department until 1907, when he was appointed Lecturer in Entomology and Zoology at Macdonald College, P.Q., which position he held at the time of his appointment to the Division. He has made a special study of forest insects but particularly the *Ipidæ* (*Scolytidæ*) or Bark-beetles, the most injurious of all our forest insects. A number of valuable papers on this group have been published by him, the chief of which being his '*Catalogue of the described Scolytidæ of America North of Mexico.*' (*85 pp., 17 plates, 1909.*) Mr. Swaine's appointment has very materially strengthened the staff of the Division and the virgin field to which he is now devoting his attention will afford him unequalled opportunities of carrying on work of the greatest value in its bearing on the conservation of our forest wealth.

Mr. J. D. Tothill, B.S.A., has been appointed field officer of the Division. Mr. Tothill specialized in entomology at the Ontario Agricultural College and was subsequently employed by the Bureau of Entomology of the United States Department of Agriculture in the Gipsy Moth Parasite Laboratory at Melrose Highlands, Mass., where he had charge of the work on dipterous parasites.

Mr. Germain Beaulieu, LL.B., a member of the Bar of the province of Quebec, was appointed a field officer of the Division, and his intimate knowledge of the insects of the province of Quebec in particular make his services of great value to the Division.

Mr. W. A. Ross, B.S.A., was appointed field officer during the summer of 1911. Previous to his appointment he had been employed by the Ontario Department of Agriculture in an investigation on the Apple Maggot, which investigation he will continue during the coming season.

During my absence from the Division, my Chief Assistant, Mr. Gibson, has had charge of the work, and in addition to assisting in the work of the Division he has also superintended the work connected with the inspection and fumigation of imported nursery stock. I wish to gratefully acknowledge his assistance in carrying on our work. My sincere thanks are due to the loyal assistance of all my other officers and to my secretaries, Mr. J. A. Letourneau and Miss J. McInnes for the conscientious manner in which they have carried out their duties.

INSECTARY.

The experimental work of the Division carried on at Ottawa has been severely resticted in the past by the lack of accommodation. The small greenhouse used for the work was wholly unsuitable and in fact almost nonhabitable in the summer, despite all efforts to keep it cool, owing to the high temperature. Plans were accordingly made for an 'open air' insectary and this has been erected during the past year (Plate V.). It consists of a work-room 12 feet by 15 feet and the insectary proper which measures 21 feet by 12 feet. The work-room contains a dark room and is separated from the insectary by a safety door. The sides of the insectary are

composed of wire screens which may be removed during the winter for storage, leaving the insectary open. Two open wells in the concrete floor of the insectary permit the planting of food plants and the burial of overwintering material. The bronze wire screening has thirty-six meshes to one inch and is as fine as would appear to be necessary and practicable. The roof of the insectary has a good pitch and provision has been made for covering it with sailcloth, leaving an air space of one foot in depth, should it be found necessary on account of unusual heat.

A small plot of ground surrounding the insectary and greenhouse has been allotted to the Division for experimental purposes.

The development of our studies of useful and injurious insects in their varied relations to man's industry and welfare is meeting with demands for their further extension. The ever increasing struggle against insect pests on the part of the farmer, the fruit grower, the forester, the stock raiser and everyman, results in a greater necessity for fuller information with regard to such pests and their control. This struggle is greater in a young country such as ours than in an old established country, and while the productivity of large areas may attract attention there is another side to the picture which the depredations of insect pests brings into view: the devasted, or twice and sometimes thrice sown grain fields or root crops and the defoliated forest, country-side or orchard. These are some of the problems which the entomologist is called upon to solve.

I have the honour to be, sir,
Your obedient servant,

C. GORDON HEWITT,
Dominion Entomologist.

REPORT OF THE DOMINION BOTANIST

H. T. GÜSSOW.

OTTAWA, March 31, 1912

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the third report of the Division of Botany, which is an account of some of the work carried on during the year from April 1st, 1911, to March 31st, 1912.

The number of enquiries received from farmers throughout the Dominion has considerably increased, so that very little time remained to carry on original researches into many important problems. Progress is, however, being made in some directions, as far as time and opportunity permit, but it is felt that the daily routine and executive work connected with the large correspondence and number of inquiries restrict more important and necessary investigations, which it is my opinion should receive the main attention of the staff of the Division.

There exists practically in every province certain pressing needs which come within the scope of work of this Division, and which should be attentively investigated to prevent the spreading of diseases or weeds, as the case may be.

Although it would be difficult to outline the work of each individual member of the staff during the year, it will be apparent that we were all working under high pressure since over 300 cases of disease were studied and nearly 1,000 plants identified, described and reported upon.

The systematic work i.e. the collecting and classifying of fungi and higher plants made very satisfactory progress. In the Botanic Gardens considerable new work was begun concerning the representation of the district flora and the collecting of seeds of trees, shrubs and other plants for exchange with other botanic gardens and institutions. Much time was devoted to the correct labelling of many trees and shrubs, all labels having been specially prepared and written in large type during the winter months by my foreman, Mr. Franz Horn, whose skill and careful work in this and other connections is much appreciated.

There have been maintained a large number of experimental plots exhibiting fodder grasses and plants, a series of clover and alfalfa variety tests, and the plots of broom corn under the charge of Mr. B. Nothnagel, who through many years of experience has shown himself a careful and reliable observer. During the winter months the services of this officer are much in demand by other Divisions, as semi-official translator of letters written in at least six foreign (mainly Slavonic) languages.

The field experiments on diseases affecting fruit-trees, grain, potatoes and other kinds of vegetation have also been in charge of this officer under my personal direction.

The vacancy created by the resignation of Mr. Herbert Groh was filled by Miss Faith Fyles, B.A., who has charge of all the work connected with the Botanic Gardens,

Herbarium, identification and collection of plants and such experiments as come within the scope of systematic botany. Miss Fyles has also shown herself to be an expert artist, and her skill in this connection has been much in requisition and has been found very useful in all phases of work of this division.

The Chief Assistantship is held by Mr. J. W. Eastham, B.Sc., who devotes as much of his time as possible to experiments in connection with the cause and control of plant diseases. His experience and careful observation will no doubt lead him soon to valuable results in some of his work. He has also charge of the cryptogamic herbarium and collection. To all these officers, including Miss Fairbairn who is in charge of the correspondence, library and records, I express herewith my appreciation for the ready help upon which I could count at all times, and without which the work of the Division would have been slow in progress.

I have the honour to be, sir,

Your obedient servant,

H. T. GÜSSOW,

Dominion Botanist.



Helminthosporium disease of Barley. *a.* Attacked ear remaining in leaf sheath. *b.* Spotted leaves. *c.* Spotted grains. *d.* Portions of aborted ear. *e.* Small, shrivelled grain, result of an attack.

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PLANT PATHOLOGY.

THE EFFECT UPON VEGETATION OF WATER TREATED WITH HYPOCHLORITE OF LIME AGAINST TYPHOID FEVER.

During typhoid epidemics the water supply of cities is temporarily treated with Hypochlorite of Lime in order to destroy the active typhoid bacilli in the water and thus prevent the spreading of this disease by means of impure water.

Coincidentally with this practice, nurserymen and others using this treated water for their greenhouse and other plants, stated that they noticed a peculiar failing in the vigour of their plants, and thus were anxious to obtain advice whether this water may be injurious to plant life. Considering the great germicidal properties of this preparation, it was thought probable that injury might also result to higher plants from its use.

For this purpose the Dominion Chemist, Mr. F. T. Shutt, M.A., and myself began a series of experiments in February, 1911, which were continued with a view of disclosing any facts bearing on the subject.

We obtained a number of plants which were suspected to be failing in health owing to their being treated with chlorinated water. Three plants of Carnations and three of Hybrid Roses of this kind were subjected to the following treatment:—

1. Potted into new soil, watered as required with snow water only.
2. Potted into new soil, watered as required with chlorinated water (0·26 p.p.m. available chlorine).
3. Potted into new soil, watered as required with chlorinated water, but boiled for fifteen minutes.
4. Potted into new soil, watered as required with chlorinated water plus 1 lb. of soot per 3 gallons of water.
5. Roses grown on the Farm used as check plants treated in the same manner with chlorinated water.

The plants were very carefully watched and kept under the same condition of temperature and culture. After three months had elapsed no difference whatever could be noticed in any of the plants. The roses blossomed freely throughout, the carnations, however, hardly recovered, having been transplanted while practically in flower. The check plants subjected to the different modes of treatment showed not the slightest signs of any injury.

Another experiment was conducted to test the effect of chlorinated water on the germination of seeds. Various strengths ranging from 0·05 to 10 parts per million of available chlorine were used. Six varieties of wheat were employed, the seed being soaked in the freshly made-up solutions, and an equal number in distilled water. (Time 12 hours.)

All samples were sown on the same day. Germination was found to be uniform throughout; no influence could be observed on the energy of germination or in the development of the young plants. Later on, a series of experiments was started with barley and oats without any sign of injury, or even retardation. The plants were grown until in flower, when the earth was washed away and the plants, root and all, were carefully dried in the air and then weighed. Although slight differences in weight between plants of the same series occurred, such did not indicate that there had been any injurious influence exerted by the chlorinated water.

Radishes, turnips, cucumbers and beans were also subjected to treatment in the same way. The cucumber plants treated with chlorinated water showed rather a more vigorous growth than those receiving snow water only. Geraniums behaved absolutely identically when treated with melted snow water and that containing Hypochlorite of Lime.

Without going into further details, Mr. Shutt and the writer, as a result of this investigation, conclude that the water supplies, as ordinarily treated with Hypochlorite of Lime have no injurious effect, direct or indirect, upon cultivated plants.

SOME DISEASES OF CEREALS.

(See Plate VI.)

Not uncommonly, there is found on the cultivated barley a disease known by the names of 'yellow leaf,' 'early blight' and 'leaf-stripe.' The last name is especially appropriate since the disease in its earlier stages takes the form of very conspicuous, elongated, yellowish-green spots, more or less sharply bounded by the veins of the leaf and frequently extending for the greater part of its length. Later, the spots turn brown, the attacked leaves die, and, owing to the loss of leaf tissue, the yield may be appreciably reduced. This disease is due to the fungus *Helminthosporium gramineum* Rabh., the spores of which may usually be found in abundance on the discoloured areas.

During the past season, there was observed on some of the barley plots at the Experimental Farm a disease due to a closely-related species of *Helminthosporium*. In this case, however, the leaf injury instead of appearing in the form of the stripe-like discolourations just described, shows as small, usually elongated spots, dark brown in colour, but often with a paler border. These spots are frequently so excessively abundant as to cause the total browning and shrivelling of the leaf. The disease is apparently much more severe on the leaves than that due to *H. gramineum* Rabh. and it also appears to affect the ears to a greater extent

Enquiry showed that the occurrence of a similar disease had been recorded in the State of Iowa, U.S.A., and described by Prof. Pammel et al. in Bulletin 116 of the Iowa Expt. Station. It was found to be due to a species of *Helminthosporium* considered by the authors to be one hitherto undescribed and provisionally named by them *H. sativum*.

Comparison of the symptoms of the disease as it occurred at Ottawa with the published description of the one observed and described by Prof. Pammel seemed to leave no doubt that the two were the same. For confirmation, however, specimens were sent to Prof. Pammel who pronounced the disease to be identical with the one described by him. Its occurrence at Ottawa is, therefore, of sufficient interest to be worthy of record apart from the possibility of its becoming a serious pest of the barley crop.

Control.—Both the diseases just mentioned are carried over from year to year by infected seed. Since, however, the fungus is actually within the grain as mycelium and not merely adhering to the surface in the form of spores, treatment of the seed with formaldehyde as practised for such diseases as stinking smut of wheat and covered smut of barley would not be of any value. The only treatment that has been found satisfactory as yet is the hot water one, used for controlling loose smuts of barley and wheat, which is somewhat difficult to carry out satisfactorily under ordinary farm conditions.

Leaf Spot of Wheat (*Septoria tritici* Desm.) was noticed in the neighbourhood of the Farm and specimens were also sent in from Saskatchewan. In no case, however, was it causing serious injury.

CONTINUED OBSERVATIONS ON FROSTED WHEAT.

In a short paragraph appearing in last year's report (p. 240) reference was made to the effect of frost on wheat. It was pointed out that frost may injure the grain more or less while the wheat is standing in sheaves, being then often in a 'dough' or 'milky' stage and compelled to dry up without the aid of the roots of the still active plant. The statement was made that the injury to grain was less when the frost attacked the uncut grain. It was inferred that frost will thus reduce the energy of germination, which would result in an uneven stand and subsequent un-

evenness in ripening. Unevenness in ripening may be due to other factors as well, but from repeated observations and experiments conducted this year certain important conclusions may be drawn supporting this claim.

Two samples of frozen wheat were secured for experimental purposes. Both samples originated from the same field, but they were remarkably different in appearance. Sample 1 was very dark and much shrivelled, sample 2 was much plumper, but still showed signs of frost injury.

A series of grains of both samples were weighed.

Sample 1, 1,000 grain (average) weight = 21.050 grammes.*
" 2, 1,000 " " " = 30,990 "

Both samples had received identical treatment and were then practically equal as regards degree of moisture.

GERMINATION AND DEVELOPMENT OF SAMPLES (AVERAGE OF THREE TESTS).

Sample.	Sown.	Germination after 6 days.	Germination after 20 days.	Height of plants. July 22.	Date of flowering. Anthers showing.	Ripening of grain Full Ripe.
1	Jan. 22	41%	78.5%	14 inch.	Apl. 27—May 3.	May 28.
2	"	72%	95%	21 "	Apl. 17—Apl. 24.	May 20.

The grain was grown in the experimental greenhouses under identical conditions. The degree of development in both plants grown from the different seeds also tends to show that unevenness in ripening has in this case been due to the frost. It must be realized, however, that, under field conditions, both samples would be sown together, when it is possible that some of the weaker plants might succumb in the struggle for existence, but it is doubtful whether such conditions would entirely eliminate the considerable difference in flowering and ripening. At any rate we would advise the farmers not to cut their grain prematurely even though frost may seem imminent. A little careful attention to the lessons from these observations will no doubt result in preventing to a large extent an uneven stand of wheat in the field.

ILLEGAL TO USE, FOR SEED PURPOSES, POTATOES IMPORTED FROM EUROPE.

The potato harvest of the Dominion in 1911 was considerably below the mark, and as a consequence importations of potatoes from abroad became a universal practice. The total imports of potatoes into Canada from European countries during the year ending March 31, 1911, was 720 bushels. But from October 1, 1911, to March 31, 1912, as many as 200,000 bushels and more have been imported into Canada from Europe. It has been repeatedly pointed out that there exist in several European countries potato diseases new to this country, and owing to the fact that Liverpool is practically the centre of the exportations, and incidentally the centre of a badly infected area, the importation together with the potatoes of one or more diseases into Canada became very probable. The general prohibition of the importation of potatoes from Europe would have been advisable under ordinary circumstances, but partly because our crop was deplorably short, and partly because the imported potatoes were primarily intended for consumption, the question of prohibiting the entire importa-

* 1 oz.=approx. 28 grammes.

tions, though carefully considered, was decided to be inadvisable. But when the planting season approached and inquiries concerning the use for seed of imported potatoes became more and more numerous, it was realized at once that the planting of diseased imported tubers would almost certainly be the means of establishing the one or the other of these undesirable diseases. For this reason the following order in council was passed without delay: 'It shall be illegal to sell, offer for sale, dispose of in any way, receive or use, for seed purposes, any potatoes imported from Europe.'

The use for seed of such potatoes has been prohibited mainly because of the danger of introducing into the Canadian soil two new potato diseases, Potato Canker (*Chrysophlyctis endobiotica* Schilb.), and Corky Scab (*Spongospora subterranea* Johns) (Figure 2). The former of these two diseases has been actually discovered in a shipment from England. Hence, it will be obvious that the repeated warnings have been necessary. Besides, experiments have shown that in our climate and soil European potatoes do not yield satisfactorily. We reproduce herewith photographs of diseased tubers taken from the affected carload of potatoes imported into Canada, showing plainly the peculiar warty outgrowths from the neighbourhood of



Fig. 1.—Ordinary Potato Scab, (*Oospora scabies* Thaxter).

the eye or eyes so characteristic of Potato Canker. Much attention is necessary to establish the identity of the disease in this condition. We have examined a large number of tubers where the primary shoots growing from the eyes have become crushed and mutilated, resembling very closely the appearance of canker. Here microscopical evidence only can reveal the true nature of these growths. This being out of the question where farmers are concerned, from whom one cannot expect the necessary technical knowledge to determine accurately the nature of the trouble, the prohibition of the use of imported tubers for seed purposes became the only alternative. To facilitate this precaution, the following order was also passed by Order in Council:—

'Every person using for seed other potatoes than such as have been raised by himself must obtain, preserve and exhibit on demand, previous to planting, a certificate from the seller or his agent stating that the potatoes to be used for seed have not been imported from Europe.'

The following provisions have been copied from the Destructive Insect and Pest Act and should be carefully studied, as any farmer or grower on whose land this Potato Canker or any Corky Scab disease is subsequently found will be asked to furnish evidence of the origin of the potatoes used for seed. Anybody found to have contravened the Act or any regulation will not only render himself liable to a fine or imprisonment provided under the Act, but will also forfeit the entire crop without any compensation.

'Compensation not exceeding two-thirds of the value as assessed by the inspector, of the vegetation or vegetable matter or containers thereof destroyed by the instruction of an inspector, shall be granted by the Governor in Council upon the recommendation of the Minister, except in cases where these regulations are carried out under the direction of the government of a province not granting compensation, or in the case of potatoes or potato crops.'

'Every person who contravenes any provision of this Act or any regulation made thereunder, shall be liable, upon summary conviction, to a fine not exceeding one hundred dollars, or to imprisonment for a term not exceeding six months, or to both fine and imprisonment. Any vegetable matter imported or brought into Canada contrary to this Act, or to any regulation made thereunder, shall be forfeited to the Crown.'

'The owner, occupier or lessee of any premises or place where any of the insects, pests or diseases specified herein shall be found, shall immediately notify the minister, and shall also send to him specimens of such insects, pests or diseases.'

Any one desiring further information about this Potato Canker is referred to Bulletin 63 of the Experimental Farm series (Division of Botany), and Farmers' Circular No. 1, obtainable free of charge from the Experimental Farm, Ottawa.

"CORKY" SCAB OF POTATOES.

(*Spongospora subterranea* Johns.)

No record regarding the occurrence of this disease on this side of the Atlantic has become known up to date of writing. Although the disease has part of its name in common with the ordinary potato scab it is in no way related, nor does it even closely resemble the common potato scab. Probably the name 'Powdery Scab,' given to it later, describes more closely the appearance of this trouble. The 'scabs' or incrustations on the surface of potatoes in this disease are filled with a powdery, olive-green mass, composed entirely of the spores of the fungus *Spongospora*. They are often present in such dense masses as to appear like the spore powder of smut fungi. The common potato scab (Fig. 1) does not alter the shape of the tuber, whereas the powdery scab (Fig. 2) frequently produces gnarled, knobby tubers covered with deep sores, almost totally unfit for any purpose. The fungus, or more correctly speaking, the slime fungus (*Myxomycete*) belongs to the same group of organisms as that causing Club Root (*Plasmodiophora*) in turnips and other related plants. It produces millions of perforated spores which infest the soil and any sound tubers that may come into contact with diseased ones. The disease is widely spread in Europe, hence it affords one more reason to abstain from using imported potatoes for seed purposes. The great danger of introducing new diseases into any country should be fully realized. The examples afforded by the ravages of the Late Blight of potatoes (*Phytophthora infestans*), which disease has also been introduced from abroad, should suffice to impress any sceptical person of its serious importance and the responsibility of any grower who commits 'an error of judgment.' To spray potatoes, as they should be sprayed, to prevent any losses from Late Blight, costs, inclusive of labour and material, twenty-four dollar per statute acre. This expenditure, however, may save every cent of loss, while spraying to prevent Potato Canker and Corky Scab has been found of no value whatever.

A large quantity of imported tubers have been examined. While it must be said that some were of remarkably fine quality, there were whole consignments that showed Dry Rot, Rhizoctonia, Scab, Late Blight, Sprain and Bacterial Rots to such an extent as to be useless for any purpose.

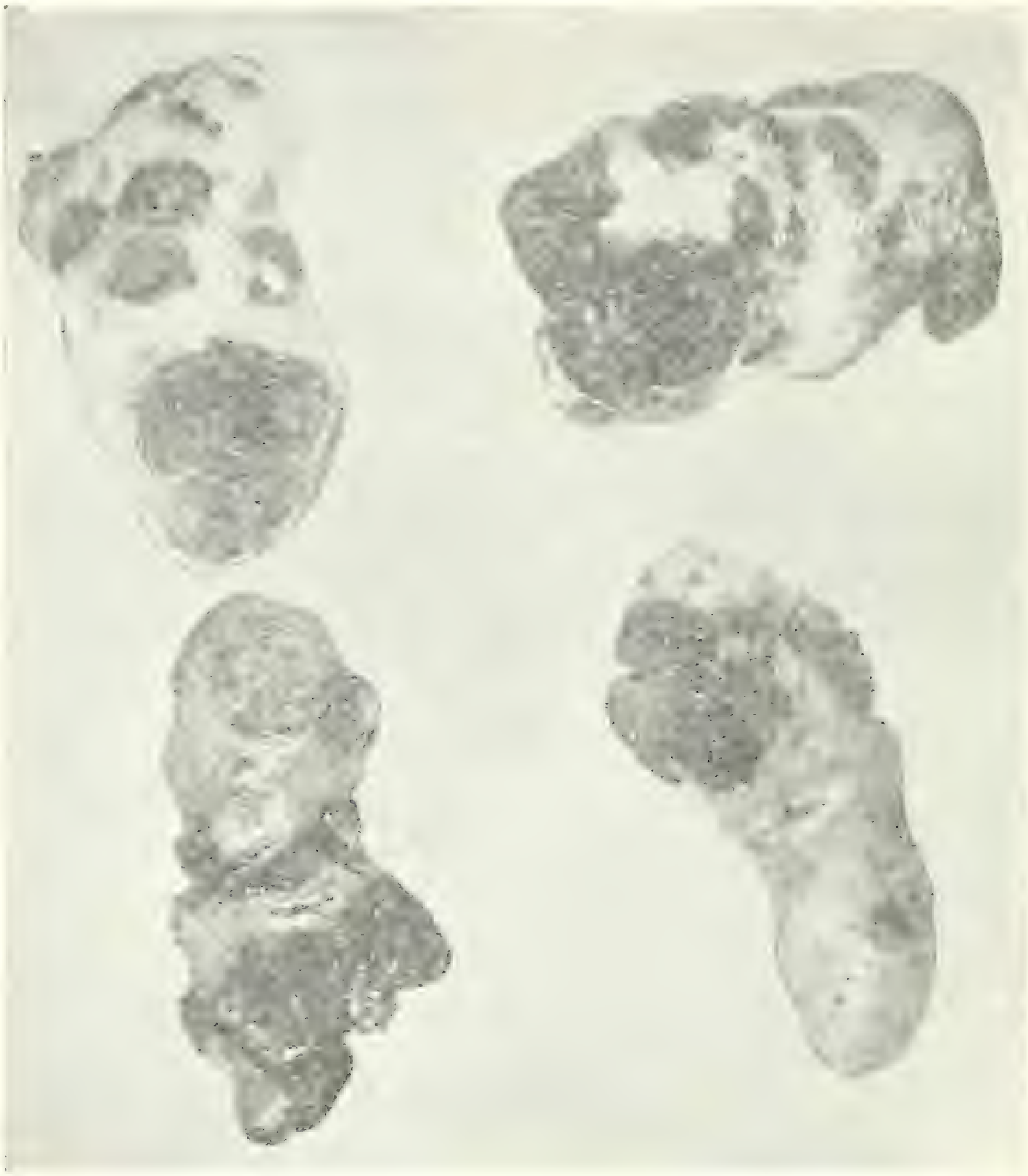


Fig. 2.—Powdery or corky scab Disease of Potatoes (*Spongospora subterranea* Johns.) Potatoes all out of shape, gnarled and covered with sores.

The risks involved from the introduction of new diseases are far more serious than may appear. It is not a question of injuring the crops and purses of one or more growers, but the whole industry of a nation may be seriously compromised. The sooner this question receives international attention the better, for only by international agreement will it be possible to prevent the wholesale exportation of diseased vegetation, and thus the distribution all the world over of diseases against which every country spends thousands of dollars annually in its efforts of control, but which it shows no concern about when exporting into any other country.

SESSIONAL PAPER No. 16

'RHIZOCTONIA' DISEASE OF POTATOES.

(*Corticium vagum* B. & C. var. *Solani* Burt.)

(Figure 3.)

Very frequently there may be found firmly adhering to the surface of potato tubers, small, dark-brown bodies of varying form, and ranging in size from a pin's head up to $\frac{1}{8}$ of an inch or so in diameter. They are usually comparatively inconspicuous when dry, but on wetting the surface of the tuber they show up distinctly. These bodies are masses of resting mycelium—commonly, but in this case, perhaps, not quite correctly, termed *sclerotia*—of a fungus. Under the right conditions of temperature and moisture, these 'sclerotia' give rise to a characteristic mycelium which was long supposed to be incapable of producing spores (i.e., a sterile mycelium) and placed in the form genus *Rhizoctonia.* In comparatively recent years, however, it has been demonstrated that this Rhizoctonia on the potato is identical with the Basidiomycete *Corticium vagum* B. & C., the latter being the spore-bearing stage. This latter name is therefore given above, as the correct scientific one, while the name Rhizoctonia is also retained as being the one under which the disease is best known.

Fungi similar to the Rhizoctonia stage of the fungus attacking potatoes are also known to cause serious diseases of many cultivated plants, for instance a form of the 'damping-off' of seedlings, and various root and stem rots of beets, beans, lettuce, tomatoes, &c. Whether many or all of these belong to the same species or not remains to be proved, but there seems considerable likelihood of this being the case.

While the 'sclerotia' adhering to the potato tuber are quite superficial and not associated with any rotting or other injury of the tuber, the conditions which have just been mentioned, as leading to the production of mycelium from them, are fulfilled when the tubers are planted. This mycelium which now develops is capable of causing quite a serious disease of the potato crop, attacking the underground stems and roots and also the stem above ground. The effects of this infection show themselves in a variety of ways. Commonly a brown, sunken, 'cankered' area may be found extending along the stem just above the level of the ground. In bad cases this may go right around the stem, 'girdling' it and causing it to dry up. This mode of attack frequently destroys large numbers of young shoots as they make their way above ground. When the tops have reached a fair size, but the underground parts which normally bear the young tubers have been attacked and destroyed to a considerable extent, a cluster of small tubers is often formed at the base of the stem just below the level of the ground. This form of the disease is designated 'little potato'; it is often associated with the formation of small leafy, green or purplish tubers in the axils of the leaves above ground (aerial tubers). Both phenomena in fact are due to the same cause, a surplus of food substances manufactured by the leaves and not used up in the usual way. Sometimes the disease manifests itself in a shortening of the shoot, the leaves being close together. The appearance resulting from this has suggested the name 'potato rosette' commonly applied to it.

The spore-producing or perfect stage of the fungus according to our experience does not seem very abundant. Some very good examples, however, were observed in British Columbia, some have been sent in during the past season from the Province of Alberta, and others were found on the Farm here. It appears to be restricted to the living host plant, and forms an adherent gray very delicate and easily removable layer for a distance of two or three inches or more along the stem or branches above ground.

Diseases due to species of Rhizoctonia are of the kind known as 'soil diseases.' By this is meant that once the organism has been introduced into the soil, it has the

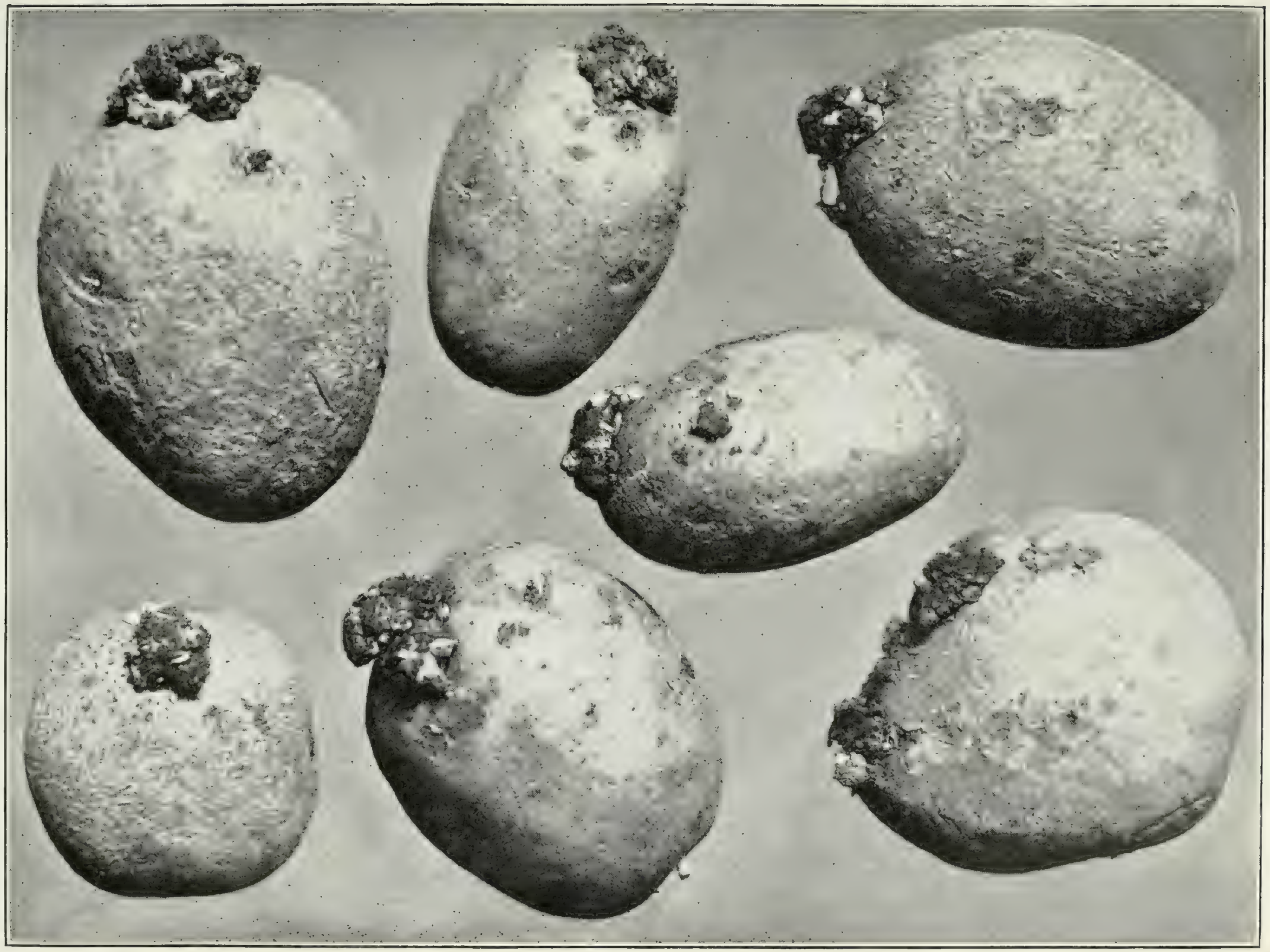
power of persisting there from year to year, waiting the opportunity, so to speak, to attack any susceptible crop that may be planted therein. If, as seems probable, the Rhizoctonia diseases affecting a considerable number of plants are due to one and the same fungus, the danger of introducing the disease into uninfected land is obvious. It is quite true that sometimes the fungus may be present in considerable amount and yet the resulting disease may only be slight, but this is simply because, as with all fungus diseases, other factors, of which for the most part we know little, influence the virulence of the parasite or the resistance of the host. It is at least equally true that when conditions favour the fungus, serious results may follow, and therefore if the fungus be present there is always the danger of such results. Hence it is most important to avoid introducing the fungus into uncontaminated soil.



Fig. 3,—Rhizoctonia Disease of Potatoes. The black spots are the so-called "Sclerotia." In this stage the fungus is carried over from the preceding year.

Although mention has just been made of a spore-bearing stage, yet there is little doubt that the parasite is mainly disseminated by the 'sclerotia.' It would greatly reduce the danger of infecting healthy soil if only tubers quite free from disease were used for 'seed.' As, however, in practice this is almost impossible to carry out, tubers which appear to be free from disease should be selected and subjected to some treatment that will kill any sclerotia adhering to them. For this purpose the treatment so widely used against potato scab is generally recommended, but does not seem to have given uniformly satisfactory results. In this connection an experiment conducted at the Central Experimental Farm this last season yielded some interesting results. Two lots of potatoes, both badly and about equally affected with sclerotia were taken. One lot was soaked for three hours in formaldehyde solution of the strength usually employed against potato scab, viz., ½ lb. in 15 gallons of water. The other lot was soaked the same length of time in a solution of 1 part, by weight of

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Potato Canker (*Chrysophlyctis endobiotica* Schilb.) as it occurred on potatoes imported into Canada from England.

corrosive sublimate in 2,000 parts, by weight, of water. This is half the strength and twice the time usually employed against potato scab. The tubers at the expiration of the treatment were removed from the solution, spread out till dry, cut and planted in beds in the same plot of ground. At harvest time it was found that the tubers grown from the 'seed' treated with formalin were almost as badly covered with sclerotia as those originally planted, while those from the tubers treated with corrosive sublimate were practically clean. It would seem, therefore, that treatment with corrosive sublimate in the manner indicated is much the more effective measure against this disease, while it is certainly just as reliable as the formalin against scab. The chief objection to the use of this chemical is its deadly nature as a poison if taken internally, so that all reasonable precautions should be taken in using it. It should also be mentioned that the solution corrodes most metals and should therefore be prepared in a wooden vessel.

Apart from treating the 'seed' in the manner indicated there is little to be done. No remedy is available for plants once attacked, and applications to the soil seem to have little value. In some Rhizoctonia diseases applications of lime to the soil have been found useful, but such alkaline dressings have a marked tendency to increase the severity of potato scab, and if this disease be also present the amount of harm done in this way would likely more than counterbalance any possible good in the checking of the Rhizoctonia.

The question of distributing this disease by means of affected tubers became very prominent at the time of sending out small samples of seed potatoes from the Farm, when it was found almost impossible to secure sound smooth tubers. For the purpose of preventing this disease it was suggested to treat the tubers in the above manner with corrosive sublimate before sending them out to farmers. The objection, however, was raised that the quantity of poison adhering to the surface of the tubers might have fatal or injurious results, should any of these potatoes be used for food, instead of for planting as intended. To ascertain whether a quantity sufficiently large to cause injury to persons consuming treated potatoes, the Dominion Chemist, Mr. Frank T. Shutt, M.A., kindly undertook to investigate this matter, and the results of his labours are herewith incorporated, with his kind permission:—

Re TREATMENT OF POTATOES BY MERCURIC BICHLORIDE (CORROSIVE SUBLIMATE).

We have carried out a series of experiments to determine the amount of mercuric bichloride that might be absorbed or retained by any given weight of potatoes on treatment for Rhizoctonia.

The treatment consisted in soaking the tubers for three hours in a solution of mercuric bichloride of the strength 1—2000, removing them from the solution and, without rinsing, allowing them to dry by exposure to the atmosphere at room temperature. The potatoes analysed were examined 24 hours after treatment.

Two methods were adopted: the first, a direct one, in which the amount of mercuric bichloride in or on the potatoes was determined, the second, an indirect one, in which the amount of this compound removed from the solution by the potatoes was ascertained. It is satisfactory to note that the results by both methods were closely concordant.

Omitting the details of the various methods used in the analysis of the tubers and the solution, it will suffice to state that we found 3 pounds of potatoes (13 tubers) after treatment to contain, approximately, ·052 grams mercuric bichloride. By analysis of the solution used in their treatment it was found that its content of the fungicide, i.e., its strength, had been reduced 10 per cent, which on calculation showed that 3 pounds of potatoes had removed, approximately, ·05 grams bichloride.

The usual dose of mercuric bichloride is between $\frac{1}{32}$ and $\frac{1}{16}$ of a grain, and the maximum official dose is $\frac{1}{8}$ grain. There are not apparently many cases on record of

fatal poisoning by this chemical, but it is stated by an eminent authority on toxicology that ·19 grams (approximately 3 grains) have proved fatal.

The amount of mercuric bichloride, according to our findings, contained on or in 3 pounds of treated potatoes, is approximately ·05 grams or ¾ grain, an amount equal to 6 maximum official doses. This, in my opinion, would render it highly desirable that the treated potatoes sent out should be accompanied by a statement that the tubers have been treated and are in consequence non-edible.

A fact of some interest that has been brought to light in connection with this treatment is that the strength of the solution is materially reduced by the potatoes. This, I think, points to the necessity of rejecting the solution after it has been used three or four times, and a freshly prepared one substituted.

(Signed) FRANK T. SHUTT,
Dominion Chemist.

From the above analysis it is quite evident that serious consequences may be entailed from the consumption of potatoes treated with so weak a solution as 1 in 2000 corrosive sublimate.

The analysis brought out, however, another very interesting fact, i.e., the material reduction of the strength of the solution. This point has to my knowledge never been exposed, and it seems reasonable to deduce that the removal from the solution of the ingredient used to kill the fungus no doubt accounts for the often limited success in preventing the reappearance of diseases, which might have been assured by employing a fresh solution after treating a quantity of tubers. An experiment will be undertaken with the view of observing the action of the solution by using it over and over again.

PHOMA ROT OF TURNIPS (*Phoma napobrassicae*, Rostrup).

(Figure 4.)

In January of this year a correspondent in Prince Edward Island sent to the Division for examination a specimen of Swedish turnip affected by this disease. According to the statement of our correspondent, the disease was first noticed when the turnips were about half grown. In some instances, the plants were killed outright while still immature, by the disease extending round them, but the chief loss occurred after the roots had been placed in storage, a large proportion of them decaying. The trouble was furthermore stated to be serious in many turnip fields in the vicinity. However, as no other specimens were submitted, it cannot be regarded as certain that the disease was the same in these other cases.

Attacked roots show discoloured areas; beginning near the centre of which the fruiting bodies of the fungus are developed; minute black *pycnidia* containing large numbers of exceedingly minute spores 4 to 6 micromillimeters long by about 2 broad. The affected spots may subsequently break down with a kind of dry rot or, more usually, the mycelium rapidly extends through the tissues, producing a soft rot. The behaviour in this respect will be governed mainly by external conditions, especially warmth or moisture. No doubt, too, in many cases various bacteria and fungi obtain entrance through the tissue first killed and assist in hastening decay.

The disease was first described by Rostrup about 1891 (*Tiddskrift for Landökonomi, R. 5, Bd.* 11: *330*), and a short note subsequently published by him in the *Zeitschrift für Pflanzenkrankheiten* 4 (1894): *322*. Later it attracted attention in England (*Potter, M. C., Jour. Board of Agric., 1900, p. 48*). It is, however, not confined to Europe being well known and destructive in New Zealand as the following extract will show (*Kirk, I. W., Bull. 14 Div. of Biology, N. Z. Dept. of Agr., 1909*):—

'Large areas of turnips have been ruined both in the North and South Islands, and the disease attained to an epidemic condition within a single season. A feature that is present this year (1908) and which was formerly absent, is the rapid soft-rotting of many of the affected tubers. This in many cases has been almost entirely due to the rapid spread of the Phoma mycelium within the tissues, breaking down the cell-walls, but in other cases bacterial agencies have come into play closely following the infection of the turnip by the Phoma.'



Fig. 4.—Turnip Bulb showing lesions caused by *Phoma napobrassicae* Rostr. (after W. Carruthers).

So far as we have been able to learn, this disease has not been previously recorded from North America, and the finding of it here would seem to add another to the list of parasitic diseases which have gradually become known, and in many cases feared, in temperate climates all over the world. Whether or not the disease is likely to prove as serious here as in the moister climate of New Zealand cannot, of course, be judged as yet, but it is certainly in the highest degree desirable that all reasonable precautions be taken to prevent it from spreading. The fungus, so far as is known, is carried over from year to year in the soil, and therefore the most important control measures should be directed towards keeping soil as yet known to be uncontaminated free from infection. Where the land has borne a diseased crop, the growing of turnips should be discontinued for some years, and care taken not to carry the soil from such a field on implements &c., to healthy land. Spores that have been eaten by farm animals are hardly likely to retain their vitality, but on the other hand, if diseased roots are fed to stock, the refuse left by them containing living spores is almost certain to ultimately find its way to the manure heap, and thus contaminate any land to which such manure is subsequently applied. It would be far preferable to destroy all the affected crop by mixing it with quicklime, or to feed it to stock only after steaming or otherwise cooking it to kill all spores. The sacrifice of a crop in such cases may seem a very drastic measure, but when it is a question of allowing a disease of unknown virulence under our conditions to

establish itself or not, too great care cannot be exercised. Affected turnips do not keep well in storage; a large number of other fungi or bacteria gain entrance through the Phoma lesions and cause a rapid decay of the roots, rendering them offensive by their odour, and disagreeable to the animals to which they are being fed.

CLUB ROOT IN TURNIPS (*Plasmodiophora Brassicae* Wor.)

Club Root, a disease affecting Turnips, Swedes, Cabbages and a large number of cultivated and wild cruciferous plants, has been fully described and figured in the report of last year p. 257 plate XI.

The disease, which disfigures and in many cases renders totally unfit for any kind of use the plants attacked, is becoming more serious and widely spread, so that farmers growing any of the plants susceptible to this disease should practise every means to prevent it or confine its attacks to the most limited areas.

Method of spreading the disease.—The disease is spread through infested soil. Soil carried from an infected field in any way contains a large number of disease germs which will immediately reproduce the disease, when coming into contact with the plants mentioned.

There is every reason to believe that the disease is spread by infected seeds. Seeds may be soaked for half an hour in a solution of 1—2,000 Perchloride of Mercury, which will not impair their vitality in the least degree, and sown when dry enough. This precaution should be employed on clean farms. Turnips sown on infested land without exception will become affected.

Do not throw any diseased portion of affected plants on to the manure heap, but throw them into a pit and apply plenty of unslaked lime. Spraying does not control the disease, as the seat of its attack is underground.

Lime versus Club Root.

Experiments with club root of turnips were outlined, and conducted at the Charlottetown Experimental Station for Prince Edward Island. The Superintendent, Mr. J. A. Clark, B.S.A., kindly took charge of the experiments throughout, and many thanks are due to him for his courtesy and trouble in carrying out so carefully the suggestions. A full account of the experiment will be published after some few years, when it is hoped that more reliable and valuable conclusions may be drawn, which one single experiment hardly admits of. Briefly, the experiment conducted was to try the effect of lime on badly infested land. Plots of 1/20 acre in size received a dressing of unslaked lime at the rates of 150, 100 and 75 bushels per statute acre; a plot of the same size received no lime.

The beneficial effect of liming was very prominent during the year of experiments throughout the plots.

Sound turnips were harvested from the untreated plots amounting to 720 lbs.

Sound turnips were harvested from the plot receiving 150 bush. lime amounting to 2,003 lbs.

Sound turnips were harvested from the plot receiving 100 bush. lime amounting to 2,332 lbs.

Sound turnips were harvested from the plot receiving 75 bush. lime amounting to 1,824 lbs.

Different dates of sowing the seed were also tried with the following results.

Sound Turnips from Average of Plots treated as shown.

Untreated plots.	Lbs.	Treated plots.	Lbs.
Sown June 1	168		747
" 15	179		651
" 30	373		664

The experiments will be continued. So far, it is shown that while the application of lime has not entirely eliminated the disease, it has notwithstanding, reduced it.

BITTER PIT OR FRUIT PIT OF APPLES.

A number of inquiries have again been received regarding this trouble, an account of which was given in the report for last year. While not nearly of the same importance in Canada as in some other countries, for instance in South Africa and Australia, it is of special interest from the fact that, notwithstanding a great deal of attention having been given to its study, it has so far received no satisfactory explanation. In Australia it has been considered of so much moment that Mr. D. McAlpine, the leading Australian plant pathologist, has been commissioned by the Commonwealth Government to devote himself entirely to the study of this disease at a salary of $10,000 per annum for a period of years or until a solution is found.

During the past year also two important papers have been published by Australian investigators which record the results of experiments undertaken to demonstrate that the cause of the disease is to be found in the poisoning of certain cells of the fruit by absorbed mineral poisons.

In the first of these papers, by Dr. Jean White, it is shown that spots quite similar to the more superficial ones of bitter pit can readily be produced by rubbing the surface of mature apples with such substances as chloroform, corrosive sublimate and arsenate of lead. It is suggested, therefore, that under orchard conditions 'pitting' is probably due to local poisoning following the entrance of some of the spray material through the lenticels of the fruit.

In the second paper Prof. Ewart, of Melbourne University, shows that the pulp cells of the apple fruit are more sensitive to certain poisons than 'any other known organisms;' corrosive sublimate for example being toxic in any solution of greater concentration than 1 in 10,000,000,000. At the same time, the uninjured cuticle and bloom are remarkably impermeable to such solutions. Young apples were found to be more readily penetrated by dissolved poisons than old ones, but, on the other hand, their pulp cells are more resistant, so that an apple at this stage may absorb a quantity of poison insufficient to cause immediate injury but yet capable of killing a group of cells as the apple reaches maturity. This is suggested as one possible cause of the deep-seated spots, but it is also believed that in this case, as also where bitter pit occurs in unsprayed orchards, sufficient poison may be absorbed by the roots and circulated in the sap to cause the death of the fruit cells. While the results of these recent investigations do not furnish all the data necessary in making specific recommendations for the control of the trouble, the advisability of adding enough lime to spray mixtures, whether fungicides or insecticides, to reduce the soluble compounds to a minimum is emphasized. Aside from this particular factor, if it be really the case that the affection may result from the absorption of naturally occurring mineral compounds in the soil control may still remain difficult or impossible, and further work along this line will be awaited with much interest by plant pathologists.

SHOT HOLE DISEASE SERIOUSLY DESTRUCTIVE TO CHERRIES IN PRINCE EDWARD ISLAND.

The Department of Agriculture of this Province called the Division's attention to the presence of a destructive disease attacking the cherries in the Island. A number of correspondents from Prince Edward Island had previously sought advice concerning the control of this widespread disease. A visit was paid to a number of localities with a view of discovering the cause and suggesting practical means of preventing the further spread of the disease.

Complaints have reached us from many quarters stating that 'all the cherry trees of the Island were being gradually killed.' The disease which certainly was very widespread was recognized on microscopical examination as being caused by a minute fungus of the 'shot hole' group. This fungus, technically known as *Cylindrosporium padi*, Karst., causes a number of roundish perforations of the leaves, which by some people are described as resembling 'gun shot' holes. The attacks of cherries, plums and other stone fruits by this fungus are by no means rare, though in Prince Edward Island the disease was unusually destructive. Correspondents observed that the trees had begun losing their leaves early in June; in some instances complete defoliation had taken place by August.

Naturally the loss of so active an agent in the nutrition of the trees results in weakening their vitality, and on repetition of the attack in the following year, when foliation is sparse already through the injury experienced the previous year, the trees finally succumb, as the result of a combination of causes—the fungus and the lack of nutrition. This was observed in almost every case examined where the trees were found dead.

The fungus prefers sour cherry trees, especially the Morello variety. The trees in Prince Edward Island are mainly wild, sour cherry, and their loss cannot really be considered of much economic importance. We have advised the growers in conversation and through the press to remove all dead and dying trees, and to collect and burn all leaves that have fallen to the ground.

As there is a probability that the fungus may live in the young twigs, it is advisable to protect the trees by spraying at intervals of a week with dilute Bordeaux mixture (5 lbs. sulphate of copper, 5 lbs. lime to 60 gallons of water) from the time the leaves begin to unfold till about three weeks after they have grown to their full size.

It also occurred to us to recommend the planting of a better class of cultivated cherry, partly because of the greater value of the fruit, and partly because the disease causes less damage in sweet varieties. Suitable varieties, no doubt, will be recommended by applying to the Dominion Horticulturist.

'POINT ROT' OF TOMATOES.

This disease, known also as 'End Rot' and 'Blossom End Rot,' was frequently made the subject of inquiry. As the name indicates, the disease is characterized by a rotting of the fruit, beginning at the blossom end. It is most injurious to early fruit, especially in greenhouses. The first sign of disease appears as a dark-coloured or watery spot at the base of the style, usually when the fruit is one-half to two-thirds grown. As this spot extends, the different tissues collapse, producing a flattening of the diseased area. Later, the surface of this area often becomes covered with a black, velvety, fungus growth. The cause of the disease is not quite clear. Various fungi and bacteria are found in the diseased spots, at least in the later stages, and several of these have been considered in different investigations to be the cause. No doubt, when a portion of the tissue has been killed, different organisms may effect an entrance and hasten the rotting, but it seems highly probable that some such injury must first occur, and that it is due to the death of cells in the vicinity of the style as a consequence of drought. It has been conclusively shown that the moisture conditions have a very important relation to the disease, and when the water supply can be controlled so as to be regular and sufficient, as in greenhouses, the loss becomes very much reduced. Under field conditions, the control of moisture is more difficult. When irrigation is not possible, surface cultivation to conserve the moisture should be followed and an attempt made to increase the humus in the soil. Prof. Stewart of

Geneva states that by carefully selecting seed from resistant plants, it is possible in a comparatively short time to secure a highly resistant strain.*

As might be expected from what has just been said, spraying has not proved of any value.

RASPBERRY CANE BLIGHT (*Coniothyrium Fuckelii*, Sacc.)

In August last, Mr. French, Assistant Provincial Holticulturist for British Columbia, sent to the Division from Salmon Arm, B.C., a quantity of black raspberry canes of the Cumberland variety, together with the following observations regarding a disease affecting them: 'It seems to affect only the black-caps. The red raspberries alongside are not affected. The berries become hard and dry early and do not grow as large as the healthy ones. They become hard and seedy with very little juice.' He further stated that in many cases the whole plant ultimately died, and that the disease was doing considerable damage in this plantation.

The symptoms mentioned, though not in complete agreement, suggested the disease studied by Stewart and Eustace, and named by them 'Raspberry Cane Blight,' and which they showed to be due to the fungi *Coniothyrium Fuckelii*, Sacc. (N.Y. Gen. Expt. Station, Bull. 226). A microscopic examination of the British Columbia canes showed the presence of *Coniothyrium Fuckelii* in abundance on many of them. A specimen of an attacked cane was sent to Prof. Stewart, who confirmed the determination.

This disease is a common and destructive one in New York State, and is probably widespread. Its occurrence in British Columbia is of interest as indicating this. It attacks nearly all varieties of cultivated raspberries, both black and red, but there is considerable varietal difference in the degree of resistance. The wild red raspberry may also be attacked. The fungus is confined to the canes, the leaves and fruit being only affected indirectly. Infection apparently takes place chiefly—though perhaps not entirely—through wounds, the effect varying with the point of infection. When infection takes place through the old stub left in pruning, the fungus gradually extends downwards, killing the branches successively as it progresses. When, however, the inoculation takes place lower down on the cane, a partial or total 'girdling' is produced, the bark and wood becoming dead and discoloured. When the 'girdling' is complete, the part of the cane above this point dies, and where it is only partial, the supply of sap to the upper part of the cane, including both fruit and leaves, dries up gradually as the fungus completes its circle of extension around the stem. Attacked canes are noticeably brittle at the diseased spot, on which large numbers of the minute fruiting bodies (*pycnidia*) are ultimately to be found. Spores are produced in great numbers from the pustules and, after dispersal, impart a peculiar, smoky colour to the surface of the cane.

The disease is largely spread in the first instance by means of infected nursery stock. Once introduced, however, into a plantation, any agent that can carry the spores from the diseased plants to healthy canes becomes a factor in its further extension. Wind, rain, insects, and the necesssary operations connected with the crop may all conduce to this, while the fungus may persist for an indefinite period on pieces of diseased cane lying on the soil.

Control measures are not easy to carry out. Where the disease has become serious, it is best to dig up and burn the old plants and set out a new plantation on land where the disease has never appeared. In doing this every care should be taken to obtain the new canes from a plantation where the disease was not present. It is not possible to tell merely by examining the canes at the time of setting out, whether

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* I have had an opportunity while visiting Geneva of seeing one of these selected strains of tomatoes in fruit where this disfiguring Point Rot had been entirely eliminated.

they are diseased or not, as the fungus may be present in them but the effects not yet visible. The plantation from which they come must be examined about fruiting time or the young plants bought under a guarantee. Cutting out and burning the old canes immediately after the fruit is picked will help to check the disease after it has once appeared. Spraying has not been found satisfactory as a method of control.

BLIGHT OF GINSENG (*Alternaria Panax,* Whetzel.)

While ginseng is not cultivated in Canada to any considerable extent, one or two inquiries have been made by Ontario growers regarding this disease and its treatment. The disease is due to the fungus *Alternaria Panax* which, presumably, winters over in the mulch or plant remains in the soil. As the ginseng shoots push their way up through the soil in the spring they become infected by the fungus, the first diseased areas appearing on the stem near the level of the ground as dead, brown, cankered spots or lines. In these spots the spores of the fungus are produced and the disease is spread by them to the leaves where it is usually more conspicuous. The spots on the leaf are very characteristic being large, more or less circular in outline, often confluent, and of a watery appearance. As the disease progresses, the leaf tissue dries out and the spot becomes papery in texture with a yellowish or brownish tint. Usually wet weather and high temperatures are necessary for the disease to become epidemic, and under such conditions it may spread so rapidly that all parts of the plant above ground may be destroyed in a few days. In specimens recently examined the fungus had attacked and grown profusely on the crown of the root.

Control.—The chief preventive measure consists in spraying with Bordeaux mixture. To be effective, this must be applied so as to protect, as far as possible, the young shoots against the first infection. The first spraying must, therefore, be given soon after the young shoots appear above ground and the application must be repeated every two or three days until they are well advanced in growth. Subsequent sprayings should be given at intervals of 10 to 14 days. In some cases, injury has followed the earlier sprayings, this being due to frost occurring after the application. It is therefore advisable to avoid spraying when there is reason to expect a sharp frost ensuing just afterwards.

LEAF SPOT OF IRIS (*Heterosporium gracile,* Sacc.)

Leaves of cultivated Iris are often attacked by this disease, and, less frequently, those of Gladiolus. It is also recorded as affecting a number of other iridaceous plants both in the greenhouse and out-of-doors. The disease shows itself as small round, elliptical, or occasionally more elongated spots of a pale-brown colour, but surrounded by a conspicuous dark-brown border. Most of the spots are usually small, but the large ones may be half-an-inch in length. The centre of the spot becomes paler with age and ultimately shows numerous minute, black points which are the tufts of spore-bearing hyphæ. The leaf tissue adjacent to the spots also becomes discoloured, and, when these are numerous, the whole leaf withers up prematurely.

Usually the disease does not develop extensively until comparatively late in the season, and the injury done to the plants is not, therefore, so serious as would otherwise be the case. Affected leaves should be removed and destroyed as soon as noticed. In this way, the spread of the disease will be checked. Where the disease has been at all severe, all dead leaves and refuse from the attacked beds should be gathered together and burned in the autumn. If allowed to remain on the plants, the fungus is found to develop abundant spores very early in spring, and the disease is almost certainly perpetuated.

BLACK SPOT OR LEAF BLOTCH OF ROSE TREES (*Actinonema Rosae* (Lib.) Fr.)

This is a common disease of rose bushes and was very noticeable around Ottawa last season. As indicated by its English names, the disease appears as black spots or blotches on the leaves. These occur on the upper surface. Individual spots are usually of small size—a quarter of an inch in diameter or less—but, when numerous, become confluent into irregular blotches of varying extent. Not infrequently the entire surface of the leaflet is thus blackened. The margin of the spot is uneven and not very sharply defined, while a close examination of the surface under a lens shows a radiating network of fungus threads. The leaf tissue around and between the spots generally turns yellow and the affected leaflets fall prematurely. Badly attacked bushes become completely defoliated much before the usual time.

Control.—It is important that the fallen leaves with the fungus on them should be collected and destroyed as far as possible, since these harbour the fungus till the following season. Early in the year before the buds burst a 'cleansing spray' should be applied to the bushes to destroy any adhering spores, and care should be taken to also spray the surface of the soil around the bushes. For this early spraying strong Bordeaux mixture (6-4-40) or a solution of 1 lb. copper sulphate in 40 gallons of water may be used. After the leaves appear, weekly sprayings may be necessary. Bordeaux mixture is satisfactory for this purpose, but produces a somewhat unsightly effect with ornamental plants. It is therefore preferable in such cases to use ammoniacal copper carbonate. Spraying should be discontinued while the plants are in bloom. Much may be done towards reducing the severity of the disease by taking cuttings from healthy plants.

DODDER ON CULTIVATED ASTERS.

In the month of September, a letter was received from a firm of florists in Ontario, asking advice regarding an abnormal condition of a bed of China or Garden Asters (*Callistephus hortensis* Cass.). Specimens of affected plants being submitted to the division for examination, it was found that they were badly parasitized by a species of Dodder. It is well known that *Cuscuta Gronovii* Willd., our commonest native dodder, has a large number of different hosts amongst both wild and cultivated plants, and it was thought likely that this species would be the one responsible for the trouble in the case under consideration. Closer examination, however, showed that the species was *C. arvensis* Beyr. The interest of this lies in the fact that this species is chiefly found on clover and alfalfa amongst cultivated plants. A sample of the seed from which the Aster plants had been raised was found to be quite free from that of any species of dodder and it would seem, therefore, that seeds must have been present in the soil from a preceding attack. No particulars, however, were available in regard to this. The pulling and burning of all the plants in the bed was recommended, and since there seemed a likelihood that some of the dodder seed had matured, it was also advised that asters be not grown there next season.

A specimen of a dodder plant was also sent in from a greenhouse Geranium, but as flowers had not yet been produced the species could not be determined.

EDIBLE FUNGI.

The Morels (*Morchella* sp.).

There are few kinds of fleshy fungi more distinctive in appearance than the various species of Morel, and since none of them are poisonous or disagreeable but all are possessed of excellent culinary properties, they may be gathered and used with perfect confidence by persons who might find considerable difficulty in separating some other edible fungi from allied species capable of producing unpleasant effects.

The size varies considerably with the different species and also among individuals of the same species, the height being from one to six inches. The larger ones are the more desirable for cooking purposes. Each individual usually consists of two well-marked portions, a stalk and a cap, which again are generally quite continuous. Both stalk and cap are hollow, and the latter is of a more or less conical or oval form.. When young, the cap is generally yellowish in colour, becoming darker with age. Old specimens are often of quite a dark-brown tint. The stalk is much paler in colour than the cap. The most characteristic thing, however, is the peculiar structure of the cap whose external surface is furnished with plates or ridges branching and uniting again in such a way as to form a complete network, the meshes of which enclose deep, more or less polygonal, pits.

The Morels appear early in the season and grow in shady places such as the borders of woods or the more open spaces therein. They may often be met with in considerable quantities, and, when more are gathered than can be used at once, they may be dried and kept for winter use, when, after soaking over night in water, their delicate flavour will be found well preserved. Morels are generally very sandy, and should be carefully washed and cleaned before use, otherwise the enjoyment when eating them will be much reduced.

AGRICULTURAL BOTANY.

The number of plants submitted for identification showed a considerable increase over last year. No new weed was brought to our attention, but some of the well-known weeds like Devil's Paint Brush, Lamb's Quarters and Field Bindweed seem to gain firm possession of some farms, and, where no vigorous methods for their eradication have been employed, they have come to stay. Again there were many inquiries concerning the suspicious nature of the common,

FIELD HORSETAIL (*Equisetum arvense* L.)

on which further observations were made. The poisonous nature of a closely related species of Horsetail, *Equisetum palustre* L.—by no means rare in this country—has been established beyond a doubt. This plant is correctly considered a highly injurious weed, both in the green and dry state. It is the common experience of observers, however, that, in the green state, this plant, and indeed a large number of other poisonous plants, is rarely eaten by stock; their power of discrimination serves as a fairly safe protection. As a rule, young and inexperienced animals fall victims to poisoning by plants more readily than do older animals. In the dry condition, in hay for instance, no animal is able to select its food, and hence the largest number of indisputable cases of plant poisoning are due to giving contaminated hay as food. Another point of interest is that some kinds of animals are far more susceptible to plant toxins than others. Thus pigs and sheep are singularly immune. Cattle and horses also vary greatly in their susceptibility. *Equisetum palustre* L. is far more serious to cattle, indeed often proves fatal, while it causes but slight trouble to horses.

Equisetum palustre L. has long been suspected as being a fatal poison, and the most recent investigations confirm this conclusion.

As regards the common Field Horsetail (*Equisetum arvense* L.), however, opinions continue to differ, some investigators regarding it as quite harmless, others as of slight importance as a weed injurious to stock from a merely mechanical aspect. In our experience, cattle do not suffer any inconvenience at all from this weed, or only very slight disturbance of their digestive organs, while horses seem conspicuously subject to fatal poisoning by this species.

In co-operation with Dr. Rutherford, Veterinary Director General, we have been enabled to collect some very important data concerning this herb. A considerable number of cases of horses being mysteriously poisoned led to an examination of the herbage being made by a trained botanical assistant, and the constant association of this weed with such cases ultimately induced me to publish a short note in the report for the year ending March, 1910, warning the farmers against this weed (Dominion Experimental Farms Report, 1910, p. 280). Meanwhile we have continued the investigations, which have now established that the common Field Horsetail is seriously poisonous to horses.

A considerable number of cases of horses being poisoned have been reported during the last year, and an examination of the hay on which they were fed revealed in every case the presence of this species of Equisetum; moreover, as soon as the food was changed, the horses, if not too seriously affected, made a rapid recovery. In no case was there present any other poisonous weed that could have been responsible for the trouble. Also the symptoms recorded by veterinary surgeons who have investigated the disease were the same in every case, so that the evidence is very conclusive.

After calling attention to the properties of this weed, a large number of inquiries were received, which showed that cases of poisoning were occurring far more frequently than one would have been led to believe.

One typical case was brought to our notice by an experienced veterinary surgeon which it is desirable to quote, as it appears of considerable interest:—

'We have a very common and peculiar disease in this locality which I call a form of spinal meningitis.

'Symptoms.—Staggering gait, partial loss of motive power, very excitable and good appetite.

'As disease progresses, mucous membrane congested, constipation, urine highly coloured, complete loss of motive power, deglutition lost, heavy breathing convulsions and death.

'In all the numerous cases that have come under my notice and treatment, I find a certain rush or weed in the food, which I am forwarding to you.

'I honestly believe the toxins from this weed are the cause of this disease, and I further know that there is little use in treating patient if allowed food with weed in it, for they seem to have a craving for weed if once affected with this disease. The patients, if still able to stand, if the weed is kept away from them and internal antiseptics, etc., used, will recover to perfect health.'

The weed submitted to me for examination was *Equisetum arvense*, L., common field Horsetail. The description of the symptoms of the diseased animals agrees very closely with all other records and those known of cases of poisoning by *Equisetum palustre*, L.

Any one observing these symptoms should at once change the food, and submit a sample to us for examination. Dr. Rutherford kindly informs us that the treatment which he recommends, and which has been proved successful by those who have had the opportunity of investigating cases of poisoning by this weed, consists of a liberal allowance of clean, easily digestible foods, the administration of a sharp purgative followed by good-sized doses of nux vomica (two teaspoonfuls in food three times a day).

When this treatment is begun before the horses lose the power to stand and can be kept on their feet, their lives can be saved in practically all cases.

In conclusion, it may be said that these weeds grow commonly in moist, undrained localities; they will soon disappear if proper drainage is provided. It may also be useful to encourage the growth of good fodder grasses by giving the land a top dressing with seed at the rate of 10 pounds per acre. This would tend to reduce the percentage of the Horsetail in the hay, though this practice should not be considered a solution of the problem.

BROOM CORN AND ITS POSSIBILITIES IN CANADA.

Broom corn is a plant belonging to the Grass family It is closely related to the Sorghums, Millets, &c. The main difference, however, from the common plants of the genus, is the peculiar character of its panicle or seed heads, which consist of a series of long, straight, upright branches. These seed-bearing stalks are of considerable flexibility and a bundle of them tied together form a very useful and durable broom. It is for this product that broom corn is mainly cultivated. Canada imports nearly all broom corn or manufactured brooms from the United States and Europe. During the present year of report, raw material and the manufactured article imported represented the value of about $420,000.

Broom corn is raised at present in Canada to a very limited extent, the fact of the value of the imported material and the information supplied by one of the foremost manufacturers in this country stating that there is a ready market for all the broom corn that could be grown in Canada, not only justifies but encourages careful attention to the possibilities of the crop in this country. Repeated inquiries have manifested the interest taken by some farmers in the raising of this crop. Exaggerated rumours of high prices, like $150 to $200 per ton which this product has on rare occasions commanded, naturally excited the curiosity and speculative tendencies of a certain class of people, but the more conservative estimate of $80 per ton and the fair yield of about one-third of a ton per acre should suffice to show that no great wealth may be rapidly gained from this source.

The successful growing of broom corn is much more dependent upon suitable climatic and soil conditions, than upon cultural methods, which differ little from those required in the raising of Indian corn. A fertile soil is necessary to produce a good 'brush,' which is the manufacturers' term for the seed-bearing heads; the plant is subtropical, and hence requires a warm, sunny climate. There is no reason to believe that there are not some localities in Canada suitable for the culture of broom corn.

In order to speak more authoritatively on the subject, we conducted a series of experiments with broom corn during the year in many different localities. The interest which these experiments have created amongst many farmers, although no perfect crop was raised anywhere, makes it desirable to continue them on a somewhat larger scale, many farmers having declared their readiness to carry out experiments on their own farms. It is hoped that in a few years satisfactory evidence may be produced in favour of or against the raising of broom corn in Canada.

As one of the more successful experiments as regards size and quality of 'brush' may be considered the one carried out at the Central Farm.

During 1911, only three varieties were tested; to begin with, the seed was not of the first class and the stand was uneven. We hope, however, for more success from the experiments to be conducted this year, when a full report will be issued.

SABLE ISLAND.

Dr. Wm. Saunders, C.M.G., the late Director of the Experimental Farms, began in 1901 a series of experiments on this lonely and exposed Island, in order to introduce some resistant kind of vegetation which would be useful in preventing the blowing of the sand and the wasting away of the coast by the action of the waves. An interesting account of Dr. Saunders' visit will be found in the report of the Dominion Experimental Farms for 1901 pp. 62-77.

The main difficulties against the establishment of trees and shrubs on the island are the absence of any depth of soil,—only three or four inches of partly decomposed vegetable matter has collected in some places—the extraordinary force of the wind, which blows often 80 miles per hour and more, the grinding power of the loose sand

itself, the rapid covering with sand of low-lying, rather more protected areas, and finally the blowing away of sand where trees might succeed, which lays bare their roots in a very short time.

Bearing these extraordinary combinations in mind, it cannot surprise anybody that very little success accompanied the planting of the many trees and shrubs, which were brought by Dr. Saunders to the island under many difficulties, and which received every care from the island's hospitable superintendent, Mr. R. J. Boutellier.

The main vegetation of the island consists of a very coarse, but useful sand-binding grass—*Ammophila arenaria*—which grows to a height of about two or three feet, but, owing to the prevailing winds it is bent down affording thus only protective covering for a height of a foot and a half or rather less. Only about 30 of the 80,000 trees and shrubs planted in 1901 have survived, but none grew above the protective height of the grass. As soon as any growth appeared above this line, the loose sand got hold of it and ground it down in a few hours during a storm. There is no protection afforded by the many sand hills, all sides are exposed to wind and weather, one side fills in, while the other is scooped out again. The incessant changes in the direction of the wind are naturally against the survival of even those trees and shrubs which have done well under similar but yet so different conditions. The erection of storm fences, which have proved satisfactory in many similar circumstances, have proved equally unsatisfactory on Sable Island. A few willows, an American elm and some roses have survived behind fences surrounding the house of the superintendent, but the leaves that may incautiously venture above the fences are rapidly lacerated by the sand or dried up in the everlasting wind.

During a few weeks visit, I observed with great surprise how eagerly the wild ponies and cattle devoured the coarse grass, which no doubt would cause considerable soreness to the mouths of the mainland animals. Yet Sable Island ponies thrive on it, and I have been told by Mr. Boutellier that they do not seem to relish timothy hay sent from the mainland in years when there is poor haying on Sable Island. The fact that this grass possesses a highly nutritive character has been clearly demonstrated by the interesting chemical analysis of it made by Mr. F. T. Shutt, M.A., the Dominion Chemist, who states that it is quite equal in protein or albuminoids to many of our highly esteemed cultivated grasses.

The question of preventing the blowing of the sand and the washing away of the shores of this island, which is a most important point of support for two lighthouses marking an extremely dangerous region of shallow spreading submerged banks, so disastrous to many a vessel, is still as prominent and unsolved as ever. After a very careful survey of the floor of the island, and in consideration of the already quoted aggravating difficulties, a probable solution may lie in the direction of encouraging and propagating as much as possible the vegetation already on the island.

During the time of my visit in August and part of September, of course a large number of plants had disappeared, or at least were no longer conspicuous by their flowers or seeds, but still about 150 different plants have been observed and collected. The vegetation on the whole affords excellent examples of the survival of the fittest, or adapation to environment, as well as remarkable features of ecology. The flora is a curious assemblage of maritime, fresh and salt water, European and American plants, and it is hoped to complete a collection of the plants on Sable Island some other time when a visit earlier in the season would augment our collection considerably. A thorough knowledge of a flora thriving on such an exposed and sandy island would be very useful in many instances where such plants may be requisite under conditions existing on the mainland.

Sable Island is very productitve of blueberries, and still more of cranberries, of which as many as 60 apple barrels-full may be collected in some years. The col-

lection and export of these fruits may be regarded as an important factor in preventing the perpetuation of this vegetation by seed, but it cannot be said that this practice is really detrimental, because there are many localities where berries are never collected, and where sufficient seed is produced. The berries grow to excellent size, and often 3 to 5 fruits may be found attached to a single stem.

There is a peculiar absence of pollenizing insects on Sable Island which would be instrumental in the act of propagation of many plants. This difficulty might be successfully overcome by the keeping of bees at the various stations. There would be food in great quantity for the bees and the honey might equal the famous moor honey of Yorkshire, where bees feed on a very similar vegetation. The keeping of sheep might also serve as a very useful measure, the close feeding of certain vegetation, the compacting of the ground by their feet and their valuable manure would tend to increase root action and produce a firmer surface. At any rate it seems clearly established that little benefit will result from the introduction of trees and shrubs on Sable island.

BOTANIC GARDENS.

One of the main purposes of a Botanic Garden is to enable the visitors interested in any particular plant to ascertain its correct name. For this purpose we have begun labelling the plants with plainly printed large labels of a permanent character. This work entails considerable painstaking and careful research owing to the difficulty of the everchanging nomenclature of plants. When, in a year or two, all plants have been labelled in this way the gardens will be much increased in value to the general public and the student of Botany. A number of new plants have been added to the collection and many are being raised from seed.

On October the 24th the garden was honoured by a visit of Their Royal Highnesses the Duke and Duchess of Connaught, who seemed to be much impressed with the beauty and variety of our Canadian flora as far as represented in the gardens. Before leaving Her Royal Highness the Duchess further honoured the gardens by planting a memorial tree in what may be said to be the most beautiful spot in the whole gardens.

It is to be regretted that certain elements among the public make themselves guilty of vandalism. Pure carelessness of some visitors has spoiled many a carefully tended plant. At Christmas time the large and beautiful collection of Conifers is much exposed to wanton destruction by persons stealing their tops for Christmas-trees. Nothwithstanding every precaution, some valuable trees are lost in this way every winter. It is hoped that every visitor will bear in mind that the gardens are solely maintained for an educational purpose. Though we cannot boast at the present moment of an exceptionally beautiful park, on account of its comparatively recent establishment, yet in years to come when the vegetation will have outgrown its artificial appearance, our gardens will certainly be one of the most beautiful on this continent. This reserve may be well considered a national property, and should be the pride of the people of Ottawa.

Over four hundred different species of viable seeds were collected during the season of 1911 from plants in the gardens. A list of these was prepared and sent for purposes of exchange to the Botanic Gardens in different parts of the world. We were thus able to supply desiderata to other institutions, and were fortunate enough to secure a considerable number of seeds in exchange which will be added to our seed collection and used to raise plants for our gardens. It is hoped that our list of seeds for exchange will be greatly enlarged, and that we thus will be able to make returns for some of the privileges accorded us by the courtesy of other institutions during the many years of existence of our own.

SEED EXCHANGE.

We are also much indebted to the Office of Foreign Seed and Plant Introduction at Washington, D.C., for many new plants which were received from this source.

In the endeavour to increase our collections we shall always appreciate any interest shown by private individuals and by kindred institutions; it will also be our aim to supply any demand for particular species of plants that may be desired by other persons who are interested in the same pursuits.

HERBARIUM AND SEED COLLECTION.

Scientific collections become enhanced in value if they are systematically and uniformly arranged. Thus in the rearrangement of the plants in the Botanic Garden, the Herbarium, and the seeds of the same, according to Engler and Prantl's system of classification, we have adopted the method of uniform indexing so that the growing plants, dried herbarium specimens, and seed of the same kind will be found under the same entry number, and thus are for more easily found by students even though they may not be familiar with the collections themselves. An interesting series of sheets has been added to the herbarium comprising the collection made on Sable Island. The collections all show the normal increase.

Some time was devoted by my assistant, Miss Faith Fyles, B.A., to preparing pen-and-ink and water-colour drawings for the report and other divisional publications, as well as for useful records of rare flowering plants, and plant diseases. This work is of great importance in enabling the farmers to more readily recognize the appearance of certain diseases of plants, and to identify noxious weeds and poisonous plants as the case may be. The division is exceedingly fortunate in having a member on its staff whose skill in this work is so exceptional. Many photographs have also been taken where it was thought necessary to keep special records.

In conclusion, the thanks of the Division are due to the many correspondents and other botanists who have readily assisted in the progress of the work or in adding to our collection.

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The Tolman or Open Front Poultry House, Central Farm, Ottawa.

REPORT OF THE POULTRY MANAGER.

A. G. GILBERT.

OTTAWA, March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR.—I have pleasure in herewith submitting to you the twenty-fourth annual report of the Poultry Division of the Central Experimental Farm.

The demand for strictly new-laid eggs and the better quality of poultry, has become very great and prices have correspondingly increased, until they reached higher figures last winter season than ever before. These facts should prove great incentives to an increased production of both commodities by the farmers of this country. In order to assist them in this good work—to their substantial benefit—much careful attention has been given, in this report, to the discussion of the following subjects, viz.:—

1. Strictly new-laid eggs and what they should be.
2. How they may be produced and marketed.
3. Prices paid for the select articles on the leading markets of the country.
4. Management of the fowls so as to have them early winter layers.
5. The better quality of poultry and the type of chicken necessary to produce it.
6. The proper care and treatment of the growing chickens in order to have them early layers and quick growers.
7. The lack of chickens of suitable market types throughout the country.
8. What leading purchasers say as to the farmer's great opportunity to make money out of poultry.

All the foregoing subjects which have a direct bearing on the production of the better quality of eggs and poultry, are treated in the following pages, from thoroughly practical standpoints. The information conveyed should be of great value to farmers throughout the country.

The experimental work of the year is described under the following headings, viz.:—

Mating up the breeding stock.
Natural and artificial incubation.
Number of chickens hatched and the progress made by them.
Management of the different colonies of layers.
When winter laying commenced.
Prices obtained for eggs during different months of the year.

I have to acknowledge the aid and co-operation of my Assistant, Mr. Victor Fortier, in supervising and carrying out many of the various experiments which form an interesting part of the work of the year. He has also attended many Farmers' Institute meetings in the Province of Quebec, besides acting as judge at numerous Fall and Winter Poultry Shows in the same province.

Mr. Walter Scott was energetic and painstaking in keeping record of trap nest results; the hatching of chickens by natural and by artificial means; the feeding of rations with a view to winter egg production, etc.

Mr. George Deavey was entrusted with the rearing and management of the chickens after hatching, a work his long experience well qualifies him to do. The care of the poultry buildings of different designs, colony houses and surrounding grounds, was also given to him.

An interesting feature of the work of the winter of 1911-12 was the trial of a poultry house built after the Tolman or entirely open front principle. A full account will be given at the conclusion of the experiment, as to the suitability of this style of house to our climatic conditions.

I have to acknowledge the presentation of sixty eggs from the Buff Wyandotte Club of Toronto. This Club is anxious that the Buff variety of the popular Wyandotte family should be tried in our Division, on their merits, as egg and flesh producers. It is needless to say that every opportunity will be afforded the variety to vindicate the claim to superior merits advanced on their behalf.

A large and growing correspondence in both English and French is a gratifying indication of the increased interest being taken in poultry keeping by the people of the country. The letters received and sent away by our Division, during the past year numbered:—

Letters received	4,956
Letters despatched	6,473

I have the honour to be, sir,
Your obedient servant,

A. G. GILBERT,
Manager, Poultry Division.

REPORT OF THE POULTRY MANAGER.

One of the striking features of agricultural progress, in recent years, is the rapid development of the poultry branch of the farm. This gratifying development affords great opportunity to the farmers of the country to make money out of what has been, in too many instances, a neglected and, as a result, non-profitable department of their work. Experiments of many years and the results obtained and published by many well known farmers, go to show that no branch of farm work pays a better margin of profit than poultry, when properly managed, and never was the remunerative prospect greater than it is at present. Never were inducements, in the shape of high prices, greater than they are to-day. Apart from these considerations there are other features of the egg and poultry industry that are well worth the serious attention of farmers. Some of the more prominent of these inducements may be grouped as follows:—

A home market of rapidly increasing proportions and value.

Prospects of higher rather than lower prices.

A growing demand for new-laid eggs and the better quality of poultry and this notwithstanding increased production and decreased exports.

Room for much production, as shown by the importation last year of $439,000 worth of eggs and poultry; game, $68,000, and of fowls, $23,000.

SOME OF THE CAUSES OF HIGH PRICES MAY BE PUT DOWN TO:

A greater consumption of new-laid eggs than supply.

The high price of meat which has resulted in a greater demand for eggs.

The convenience and despatch with which eggs may be prepared.

A growing appreciation of new-laid eggs as nutritious and toothsome articles of food.

A popular opinion that there is less waste in a dozen of eggs—at the highest price—than in meat of same value.

The greater frequency with which physicians prescribe eggs in many forms of sickness.

The extra care and effort necessary in the production of strictly new-laid eggs and the better quality of poultry.

REASONS WHY PRICES ARE LIKELY TO BE GREATER THAN LESS MAY THUS BE GIVEN:

An increasing population with proportionately increasing demands.

Rapidly growing cities which draw upon a large extent of surrounding country for supplies.

Should there be greater production at any time than the home market requires, there is the unlimited English market ready to take that surplus.

Other reasons might be given but enough has been said to show the paying possibilities of the poultry end of farm work. It is to be borne in mind that it is only strictly new-laid eggs and the superior quality of poultry for which there is the demand at highest prices. It should be the aim of our farmers to place upon the market none but the best quality.

THE NEW-LAID EGG AND WHAT IT SHOULD BE.

First we take into consideration the new-laid egg and how to procure and market it. Secondly the superior quality of poultry and how it may be obtained. This leads to the question, 'What is a new-laid egg?' A new-laid egg should be:—

1. Non-fertilized.
2. Well flavoured.
3. Clean and inviting in appearance.
4. Placed in the hands of the consumer as soon as possible after being laid.
5. Neatly put up in cardboard boxes, or, clean humpty-dumpty crates.

Germless.—It is important, especially in the summer season, to have the non-fertilized, or germless egg, for where there is no germ there can be no germ development, which is likely to take place in warm weather.

Well flavoured.—Good flavour can only result from the feeding of pure, wholesome and varied rations. Corn or cornmeal as part of a ration tends to good flavour and better keeping.

Clean and inviting in appearance.—Eggs will be clean and inviting in appearance if laid in clean nests and collected soon after being laid. A strictly new-laid egg has a chalk-like appearance and a porous shell.

Placing of eggs in the hands of the consumer.—Eggs should be neatly put up in cardboard cartons to hold one dozen each. As a guarantee of their being new-laid they should have the name of the producer stamped on them. The humpty-dumpty egg crate is a neat and clean package. It holds twelve dozen eggs and for that reason is easier to fill with eggs, while strictly fresh, than the larger thirty dozen crates so often used. Too frequently, the farmer holds the eggs until he has enough to fill the larger crate, while it would have saved the eggs from becoming stale, had he used the smaller package. The object should be to get the new-laid eggs to private customer, storekeeper, or market, as quickly as possible after the eggs are laid.

The value of the strictly new-laid egg.—The new-laid egg as above outlined cannot fail to be delicious and toothsome, and will receive the highest price. In order that it may receive the best value, it should be put on the market when the demand for it is greatest and price the highest. It is only good business to sell when the product is worth most. The month of November and the winter months of December, January and February have been, for many years past, noted as the periods of high prices. Do farmers aim to have new-laid eggs at this season? It is to be regretted that, in far too many instances, they miss this paying opportunity, for the reason that their hens are either moulting or beginning to do so. As a result, their fowls are non-productive at the season of best prices. In too many instances the farmer's fowls commence to lay in the month of February, when, eggs are beginning to come in freely and prices are on the decline.

A HINT FROM A MONTREAL PURCHASER.

The following letter from a well-known family grocer in the City of Montreal conveys a hint that farmers will do well to be guided by:—

MONTREAL, January 17, 1912.

DEAR SIR.—Yours of 15th instant came to hand yesterday, but as yet I have not heard from Mrs. M———.

We are getting any quantity of new-laid eggs now and prices have gone off. November and December are the two months in which we find eggs very scarce. If

hen farmers would try and arrange to have their hens lay well during the months named, they would always receive a high price, and the parties who supply us during the season mentioned, we feel in honour bound to continue taking from in the Spring and Summer. I may yet be able to take Mrs. M——— eggs.

Sincerely yours,

(Sgd.) WALTER PAUL.

THE HIGHEST PRICES AND WHEN PAID.

The prices paid by Mr. Walter Paul and other Montreal dealers, were quoted in the report of last year, which ended March 31, 1911. Summarized they are as follows:—

Month of November..	40 to 45	cents per doz.
" December..	50 to 60	"
" January..	50 to 35	"
" February..	35 to 28	"
" March..	28 to 20	"

These quotations were fairly representative of the prices paid in all the larger cities of the Dominion, with the exception of British Columbia, where higher figures were paid. A correspondent in that Province, who is a fairly large producer of eggs, quotes the average price for last year at 55 cents per dozen.

The past winter of 1911-12, was unusually severe in Central and Eastern Ontario, and the high price of 50 cents per dozen was quoted on the Ottawa market as late as the last week in February. And many of the eggs sold at the high prices named—there is reason to believe—were far from fresh.

CONDITIONS WHICH MUST BE COMPLIED WITH.

But, before the high prices of November and December, which are above quoted, can be obtained, there are certain conditions which must be thoroughly understood and complied with by producers, viz.:—

Hens must moult early to be layers in November.

Pullets of the utility varieties require to be hatched out no later than the first week in May. Sooner if possible.

Hens should be of prolific egg-laying characteristics.

To be early layers pullets should be well fed and cared from time of hatching.

HOW THESE CONDITIONS MAY BE MET.

To have layers in November, the farmer requires to adopt one of two courses: FIRST, his hens should be fully feathered and completely over their moult by the middle or end of October. So far from this being the case, in too many instances, the farmers hens lay to a late date in the summer season. As a result they moult late and a hen which moults late is usually a late layer. Instances are not infrequent where the hens, on many farms, do not begin to lay until the genial weather of spring incites them to do so.

SECONDLY, to have pullets hatched so early that they will be well developed and in laying condition by November. There would be no difficulty in attaining this desirable end but for the fact, that hens, on many farms throughout the country, do not exhibit the broody instinct until the spring season is well over. It has been frequently pointed out in previous reports that to have early sitters, hens should lay well during winter. Here it is where the incubator comes in very conveniently—

for by its use a large number of chickens may be hatched out at one and the same time, provided, of course, that the germs of the eggs are strong enough, which they ought to be (especially on a farm) by the middle of April.

THE BEST TIME TO HATCH OUT CHICKENS.

The experience of many years in hatching chickens, at different periods of spring time, leads to the conclusion that chickens hatched out during the first week in May make the most satisfactory growth, catching up to and, frequently, surpassing the earlier-hatched birds. For that reason, the first week in May is recommended as the best period for the farmer to have his hen, or incubator-hatched chicks make their appearance. It may be said that the first week in May is too late to hatch Brahma, Cochin, or Orpington chicks. But we do not recommend either of the first named heavy breeds to farmers, for the reason, that they are too slow in maturing. If the Orpington chicks are well cared for and fed from time of hatching as all chickens should be, the first week in May will not be found too late. But chicks hatched later than the middle of May, more particularly of the heavy varieties, are not to be recommended. If conditions are favourable, by all means, have earlier hatched birds. In the case of the farmer, conditions in the shape of brooder house, or other means of keeping the early hatched chickens warm, independent of outside temperatures, are not frequently found. Hence the recommendation to the farmers to have their chicks come out during the first week in May. At that time the weather is usually warm enough to permit of the young birds being placed outside on the rapidly growing grass. With proper treatment the chicks will be found to literally grow with the grass. When twelve or fourteen weeks old, the pullets should be removed from the cockerels and gently pushed, so as to have them layers in November. The cockerels should be disposed of as soon as fairly well developed, unless kept for breeders as shown under the head of 'How the better quality of poultry may be procured.'

Full instructions as to the proper feeding, care and management of the chickens, from time of hatching until mature age, will be found immediately after the discussion and consideration of 'The better quality of poultry.'

THE SUPERIOR QUALITY OF POULTRY.

As in the case of the finely flavoured and strictly new-laid egg, the production of the superior quality of poultry requires compliance with certain conditions without a thorough knowledge of which success is impossible. The more important of these conditions may be named as follows:—

1. A thorough knowledge of breeds which make the earliest and best market types. Suitable market types are shown later on.

2. The quick development of the chickens of correct type by proper feeding and care.

3. The appreciation of the fact that a chicken may be of the very best type, but if allowed to 'pick up its own living,' it will develop sinew, muscle, bone and feathers, rather than the tender, juicy flesh so much desired.

4. Chickens, coops and colony houses must be kept free of lice. Lice-infested chickens do not thrive. The food has not the same beneficial effect, if a large number of lice are taking the life blood from the young birds.

5. A chicken free from lice and constitutionally robust will be a hearty eater and a quick grower.

6. Without other means than the regular and generous feeding of wholesome rations the young cockerels of correct type should, after two months of age, put on flesh at the rate of one pound per month, and, if in the hands of one who knows how to push the chickens, a gain of at least a pound and a quarter

per month should be made. The writer has time and again had Barred Plymouth Rock cockerels weigh four pounds and a quarter at the age of three months and five pounds and a half and six pounds in four months.

THE GREAT DEMAND FOR CHICKENS OF PROPER TYPE.

There is a growing demand for plump, well plucked and neatly dressed chickens, with a flesh of fine grain and texture. This is proved by the following statements made by extensive purchasers of poultry flesh throughout the country.

Mr. Marshall, M.P. for East Elgin, Ont., who is a member of a firm of canners, asked, while the writer was giving his evidence before the Committee of Agriculture and Colonization of the House of Commons, in the month of February last, the following questions:—

Q. The average weight of the chickens, throughout the country, is three pounds?

A. Yes. Perhaps due to the fact that too many of the chickens, throughout the country, are of a nondescript character.

Q. Are there not a good many now producing poultry for market apart from eggs?

A. There are.

Q. What can poultry be produced for?

A. That depends upon the kind of chickens and how handled. The farmer has a great opportunity to produce the best types of poultry.

Q. The reason I ask is that we are large packers of poultry. I think we had something like 150 tons last year and we paid 14 or 15 cents a pound. We get them dressed with the legs and heads cut off. We find in the section I am living in that there is a lot of money in producing poultry for the market.

A. There is doubtless money in both poultry and eggs.

Q. What surprises me is that the farmers who are pretty sharp people *do not go more extensively* into the business.

The remarks quoted are important as coming from a shrewd business man who knows what he is talking about.

WHAT ANOTHER LARGE PURCHASER SAYS.

Another instance of the disastrous effects on the development of larger markets and the obtaining of better prices caused by the breeding of scraggy and small types of birds by farmers, rather than large and fleshy birds, is thus shown by another purchaser. Mr. Ashton, of Morrisburg, Ont., who is extensively engaged in the fattening of poultry of the better quality, is the purchaser referred to. He carried a letter of introduction from Mr. Andrew Broder, the well known Member for Dundas, to the writer. Mr. Ashton made the extraordinary and important statement, that his business was SERIOUSLY CURTAILED for the reason that he COULD NOT get birds of the PROPER TABLE TYPE IN QUANTITY ENOUGH to fatten. Yet another statement was received from the agent of Messrs. Swift & Company, of Chicago, who is managing a branch at Stratford, Ont. The agent writes as follows:—

On behalf of Messrs. Swift & Co., I have become very much interested in the poultry business in Ontario. I would like very much if we could be the means of assisting the farmers to produce and better finish (flesh) a better type of table poultry for table use. Of the 75,000 to 100,000 heads which we killed during the past season, a very large percentage of them—especially chickens—were of poor varieties and too thin for marketing. * * * One of the weak features in Ontario is the large proportion of small, thin breeds such

as Leghorns, Game-crosses, and one or two of a black breed, possibly Black Spanish, etc. One of my chief reasons for taking up this question with you is the hope that your department might co-operate with us in encouraging the breeding of Barred Rocks and other suitable types of table poultry.

The above statements and quotations show that extensive purchasing firms are seriously handicapped in their business operations, owing to their inability to purchase—throughout the country—birds of suitable fleshing types in numbers sufficient.

Surely the farmers of the country are equal to the occasion. It is ever to be borne in mind that it costs no more to raise a correct type than it does a nondescript. The latter fact has been emphasized many times in previous reports.

HOW TO PRODUCE THE BETTER QUALITY OF POULTRY.

To have chickens of the desirable type and quality, such as are wanted by the wholesale purchasers named, they required to be:—

(*a*) Of correct market type.

(*b*) Must be the progeny of utility birds, also of correct type and flesh quality.

(*c*) Must be carefully housed and well and regularly fed from time of hatching until saleable age.

(*d*) Should not be 'allowed to pick up their own living' without being otherwise well fed.

(*e*) A chicken allowed to become 'stunted' from being 'stinted' of food will not make a desirable specimen.

(*f*) Chickens and their houses should be kept scrupulously clean and free from lice. Chickens infested with lice do not grow well.

(*g*) A desirable chicken should be a quick grower and a hearty eater.

UTILITY BREEDS OF ACCEPTABLE MARKET TYPE.

The Plymouth Rock family.
The Wyandotte family.
The Orpington family (especially the White).
The Dorking family.
The Rhode Island Red family.

Several other varieties might be named. The foregoing however, are best known and are certainly held in the greatest numbers throughout the country.

THE PROPER CARE AND TREATMENT OF THE CHICKS.

At this point it will, doubtless, be interesting and useful to outline the proper care and treatment of the chickens from time of hatching. It is to be ever borne in mind that the chickens may come from a strain of the very best layers, or the most correct market types, but if they are not *well* and *carefully fed* and *properly looked after, from their first days,* they will never make early layers or desirable market specimens. The following course of treatment has been found successful in practical operation—in the Poultry Division—for many years past, viz.:—

A.—Chickens hatched by hens should remain undisturbed in the nest under the hen mother until thoroughly 'nest ripe.' If hatched in incubator they should remain in the nursery until well dried and strong on their legs.

B.—They should then, with the hen, be removed to a coop on the grass outside, and placed in a bright and warm spot. The coop should be slatted so that, while the mother hen is confined to the inside, the chicks may run out or in as they desire. If incubator hatched, the chickens, when fit, should be removed to a brooder which has been warmed to a temperature of 95 degrees and otherwise prepared for the reception of the youngsters.

C.—Before removing the hen and her brood, it is a good thing to gently remove the hen and allow her food and drink. It should be borne in mind that the hen has been steadily on the nest for 36 hours bringing out the chicks and is, doubtless, very hungry. She is more likely, if well fed, to brood the chickens to their great benefit than if she was in a starved condition. It is well to see that both hen and coop are completely free from lice. A lice-infested hen is in a miserable condition; lice-infested chickens soon take their departure from the world. The hen should be kept free from lice while she is sitting so that she will have none when the chickens are hatched, for what is put on the hen is often hurtful if not fatal to the chickens. Should lice be discovered on the hen when with her brood, take her out of the coop and rub the breast feathers and those under the wing the wrong way with a cloth damped (not wet) with coal oil. This treatment will do the hen much good and the chicks no harm.

PROPER RATIONS.

First day.—No food is really necessary for 48 hours. The last thing that should occur before the chick breaks its way out of the shell, is the complete absorption of the yolk. The yolk will furnish nourishment for the chick until it is absorbed, which will be completely done in the case of every strong and robust specimen.

Too early feeding is conducive to acute indigestion, which is fatal in almost every case. It has been noticed that when the chicks have been robust and vigorous and properly handled, during the first days of their lives, no white or any other kind of diarrhœa has followed.

The first thirty-six hours.—No food is required; the properly absorbed yolk furnishes the necessary nourishment. Some breeders keep their newly-hatched chickens without any food for a longer period, and then give grit of chick size, followed by stale bread crumbs, or one part finely-cut hard-boiled egg to three of bread crumbs. Much depends upon the vitality displayed by the chicks. A fatal mistake, frequently made, is to give the newly-hatched chicks food before they have completely absorbed the yolk.

From thirty-six to forty-eight hours.—Give stale bread crumbs, or finely broken pieces of cracker. A very little finely chopped hard-boiled egg may be added to the stale bread crumbs or broken crackers.

Third day.—Give stale bread soaked in milk and squeezed dry till crumbly. Later in the day or the day after add pin head oatmeal, finely crushed wheat, or rolled oats. Continue this treatment for eight or ten days, when finely crushed corn may be given. Boiled rice at any time, on or after the third day, will be found valuable. It is not only nourishing but a bowel corrective.

After twelve days, whole wheat is in order, but should be fed in small quantity at first. Continue the finely crushed corn and boiled rice.

After fifteen days add a little cut green bone. It will be much relished and do much good.

Three weeks and after.—At three weeks a mash made of some or all of the above ingredients with cornmeal or finely ground oats or shorts may be fed. At first, feed a little and often, say a little once every two or three hours. After five or six weeks of age three times per day or oftener if found necessary. Leave no food to turn sour or become fouled.

When well feathered, the chicks should be removed from the smaller coops to colony houses. Ere this the mother hen, if well looked after, has commenced to lay and should be placed among the other adult birds.

Subsequently the cockerels are removed from the pullets and the latter gently pushed so as to be layers in November.

The following quotation from annual report of 1910, has such an important bearing on the successful management of chickens that it will bear repetition, viz.:—
'Growing chickens require special care during the first five or six weeks of their 'lives. During that period there is a steady drain on the system of the chick made 'by the rapidly growing feathers as well as by developing bone, sinew and muscle. 'This fact is frequently overlooked.'

Much attention has been given in the foregoing to the different phases of the hatching and rearing of chickens. Many of the points emphasized are either unknown or wilfully ignored. All of them have an important bearing on results and should be fully appreciated and practised—not only by farmers—but by all poultry keepers throughout the country.

THE MOULTING PERIOD.

If it is considered advisable to bring on an early, or midsummer moult, the following method which has been successfully tried in this Division will be found practicable: At the end of June the sale of eggs for hatching is usually over. A few days later the pens of breeding hens were broken up, the male birds being first removed to another building which contained small compartments with limited outside runs. These small divisions made admirable habitations for the male breeders. The hens with which there were no male birds were then allowed to run at large. In the case of our poultry houses there are small fields in rear of the poultry runs. These fields which contained grass, clover and shade—three important essentials—made ideal resorts for the hens. At this stage the rations were reduced to half quantity. The effect of this was almost to stop egg production, which was the object aimed at. The half rations were continued for two weeks, when full quantity was again resumed. The full ration was composed as follows:—

Mash of coarsely ground oats two parts; shorts one part; gluten meal one part with beef scraps in proportion of one pound to fifteen fowls. The mash, which in summer was mixed with cold water, was fed three times per week. At times a small quantity of linseed meal was added. The beef scraps were used in lieu of cut green bones, because it was not convenient to procure the latter. If mash was fed in the morning, wheat or oats, or both mixed, was given in the afternoon, or *vice-versa*. On such days as mash was not given, grain took its place.

Dr. Sanborn, a well known authority on poultry management, says in regard to the moulting period:—

> 'A moulting hen is easily fattened. Hence at this period feed lightly of those foods which produce fat. Corn, corn meal, middlings, potatoes, must be used sparingly. Increase the amount of green bone, bran and skim milk. A run in a field of clover will be a help. Keep all males by themselves during the moulting period. Shelter the hens from storms or cold rains. The ideal place for a run is an apple orchard where in addition to the grass may be found insects in the fallen fruits, etc. Birds should go into the moult not fat, free from lice and with no mites in the house.'

The moulting period usually lasts from ten to twelve weeks, but in the hands of experienced poultry keepers that time may be reduced. A Nova Scotia poultry keeper claims to have shortened the moulting period by boiling beef heads, then breaking them into small pieces and finally putting them through his bone cutter

and feeding in generous quantity to the moulting hens. As a result he says that some of his birds were laying all the time of their moult. It would be interesting to know whether these midsummer layers made early winter layers or no. The chief aim of the midsummer moult is to have the hens laying freely by the first or second week in November. Again, there are several poultry keepers of experience who claim that early pullets are the solution of early November laying, rather than the early moulting of the laying stock. Both sides have their advocates. We rather lean to the early moulting practice. It may be interesting to note the following, which careful observation has made evident in past years:—

That yearling hens moulted earlier and easier than older ones.

That the progeny from parent stock which had moulted during summer instinctively did so at the same period of the year when fully matured.

That the moulting hens were much benefited by a run in a field where clover, grass and insect life were found.

That where moulting fowls were confined to limited runs, it was found necessary to feed meat and green food at regular periods.

EXPERIMENTAL WORK OF THE YEAR.

The experimental work of the year commenced at the closing of the fiscal year, March 31, 1911, when the following breeding pens of fowls were mated up, viz.:—

TABLE 1.—Showing how the breeding pens were mated up.

Pen No.	Varieties.	Males.	Females.
	House No. 1.		
1	White Plymouth Rocks	1	15
2	White Wyandottes	1	10
3 & 4	White Leghorns	1	29
5	Barred Plymouth Rocks	1	13
6	Black Minorcas	1	7
7	Buff Orpingtons	1	13
	House No. 2.		
	Contained males of different varieties which were used as breeders. A number of spare birds to be used in case of necessity were also kept on hand.		
	House No. 3.		
22	Black Minorcas	1	10
26	White Leghorns	1	21
28	Black Orpingtons	1	2
29	Barred Plymouth Rocks	1	5
	House 2. (Cold) Tolman.		
32	White Wyandottes	1	20
33	Barred Plymouth Rocks	1	26
34	Buff Orpingtons	1	15
35	White Plymouth Rocks	1	15
36	Barred Plymouth Rocks	1	24
	House 3. (Cold).		
37	Barred Plymouth Rocks	1	14
38	White Wyandottes	1	11
39	Barred Plymouth Rocks	1	24

EGGS SOLD FOR HATCHING.

As in previous years there were many more orders received for eggs for hatching purposes than could be supplied. The demand—which came from all parts of the Dominion—was well calculated to instance the widespread and rapidly growing interest being taken in poultry keeping as compared with a few years ago. Numerous orders were received from farmers and others in the Northwest provinces. While such orders were filled with pleasure it was pointed out to the purchasers that results would likely be more satisfactory if the eggs were obtained from breeders near home, for the following reasons:—

(*a*) The saving of express charges.

(*b*) Despite careful packing, the shaking up which the eggs receive *en route* tells against satisfactory results.

(*c*) The importance of purchasing eggs laid by acclimatized fowls, a point well worth considering.

(*d*) The excellent quality of the stock held by the numerous poultry keepers and breeders throughout the Northwestern provinces.

Proof of this latter statement is found in the fact that the poultry shows held in the cities, larger towns and agricultural fairs of Manitoba, Saskatchewan and Alberta, rank among the best in the Dominion. The same may be said of the still more western province of British Columbia, from which not a few orders were received. Apart from these considerations it is to be borne in mind that poultry departments, in charge of competent officers, are attached to the agricultural colleges in the first three named provinces. In British Columbia there is a Provincial Poultry Instructor and assistants, connected with the Department of Agriculture, at Victoria, B.C.

CHICKENS HATCHED BY HENS AND BY INCUBATORS.

The following table, No. 2, shows the number of chickens hatched by natural and by artificial means:—

TABLE No. 2.

Date.	Hatched by.	Number.
1911.		
April 26	Incubator	98
May 1	"	99
" 8	"	58
" 12	"	18
" 12	Hens	13
" 13	"	10
" 14	"	18
" 15	Incubator	122
" 22	"	51
" 22	Hens	24
" 26	Incubator	38
" 30	Hens	54
Total		603

The feeding and management, which the chickens received, are outlined on a previous page. With the care and treatment as described, the progress of the chickens

was satisfactory, particularly so in the case of a group of chickens which was placed on a new piece of ground in an adjoining field. It is hoped to place all the chickens now hatching out on new ground.

SALE OF BIRDS IN THE FALL SEASON.

There was a brisk demand for young and adult stock during the early fall months. Many fine cockerels were sold for breeding purposes at prices varying from one to five dollars, according to quality. Several spare hens were sold at one dollar each. The pullets were reserved for layers and their worth as such was estimated at two dollars each. The birds sold numbered 240 males and 113 females of various varieties.

WHEN THE HENS AND PULLETS BEGAN TO LAY.

TABLE No. 3.

Breeds.	Hens or Pullets.	Date.
White Wyandottes	Hens	November, 17, 1911.
Buff Orpingtons	"	" 20, "
White Leghorns	Pullets	" 24, "
White Wyandottes	"	" 28, "
Barred Plymouth Rocks	"	" 30, "
Barred Plymouth Rocks	Hens	December, 2, "
White Plymouth Rocks	"	" 2, "

NUMBER OF EGGS LAID DURING THE YEAR.

TABLE No. 4.

The following is a list of the number of eggs laid during the different months of the year, dating from April 1, 1911, to March 31, 1912.

1911 —	April	3,426
	May	2,639
	June	1,683
	July	1,199
	August	676
	September	566
	October	114
	November	88
	December	676
1912 —	January	1,130
	February	1,615
	March	3,110
	Total	16,922

VISITORS.

During the year we had the pleasure of receiving a large number of visitors. Among them were several expert poultry keepers from England who evinced much interest in Canadian methods of housing, feeding and management. Particular attention was given to the cotton front method of keeping the laying stock during the winter season. Much gratification was expressed at the number of eggs laid under conditions so different to the popular opinion that fowls had to be kept in a warm house during the winter season before a satisfactory egg yield could be secured.

INVESTIGATION INTO POULTRY DISEASES.

The Poultry Division is indebted to Dr. C. H. Higgins, Pathologist, Health of Animals Branch, Department of Agriculture, for his skilful examination of numerous cases of poultry diseases, which from time to time were received by us and submitted to him. From the number of these cases and the fact that they came from widely scattered parts of the Dominion, it is evident that two diseases, viz., Blackhead in turkeys and Tuberculosis among fowls, are the most widespread and fatal, and are creating much havoc among the poultry of the country. Both diseases demand the immediate attention of the proper scientific authorities in the interests of the farmers of the country, who are the principal sufferers. Instances are mentioned by correspondents who state that the rearing of turkeys in their districts has become impossible owing to the prevalence of Blackhead. Dr. Higgins, for some years past, has given much attention to both diseases, and two circulars recently issued by him, one on each of the diseases named, will be read with much interest and benefit.

TABLE No. 5.

STOCK ON HAND ON MARCH 31, 1912.

Pen No.	Breeds.	Cocks.	Hens.	Cockerels.	Pullets.	Total.	Remarks.
1	White Plymouth Rocks		17	1		18	Heated house No. 1.
2	White Wyandottes		10	1		11	" " 1.
4	White Leghorns	1			29	30	" " 1.
5	Barred Plymouth Rocks		13	1		14	" " 1.
6	Black Minorcas			1	8	9	" " 1.
7	Buff Orpingtons		13	1		14	" " 1.
22	Black Minorcas		10	1		11	" " 3.
26	White Leghorns	1	21			22	" " 3.
29	Barred Plymouth Rocks		5	1		6	" " 3.
32	White Wyandottes	1			20	21	Cotton front " 4.
33	Barred Plymouth Rocks	1			26	27	Open " " 5.
34	Buff Orpingtons	1			15	16	" " " 5.
35	White Plymouth Rocks	1			16	17	" " " 5.
36	Barred Plymouth Rocks		24	1		25	" " " 5.
37	" " "	1			14	15	Cotton " " 6.
38	White Wyandottes	1	10			11	" " " 6.
40	Barred Plymouth Rocks	1			26	27	" " " 6.
	For breeding purposes	2	2	14	2	20	In different pens.
	Capons	2				2	In houses No. 2 & 3.
	Total	13	125	22	156	316	

EXPERIMENTAL STATION FOR PRINCE EDWARD ISLAND

REPORT OF J. A. CLARK, B.S.A., SUPERINTENDENT.

CHARLOTTETOWN, P.E. ISLAND, March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa, Canada.

SIR,—I have the honour to submit herewith the third annual report of the Experimental Station for Prince Edward Island.

I have to report a year of advancement. While the weather conditions were not so favourable as those of the previous year, yet very satisfactory crops were grown. A large amount of improvement work has been done. The grounds have been laid off into lawns, groups of shrubbery and a system of driveways, and the farm divided into plantations and series of rotation experiments. New buildings have been erected and the system of tile drainage extended so as to include practically all the land on the Station in need of drainage at present.

Owing to the very light snowfall of the first three months of 1911, frost entered the ground to a much greater depth than usual. The spring rainfall was light, while that of the growing season for grasses and grains was only 5·58 inches compared with the same period, April-July of 1910, which was 14.3 inches, or very little more than one-third There was no late spring frost. The great depth of frost in the ground conserved the moisture during seeding time so that the crops came on much better than the above figures would indicate.

The spring was very cold and backward. Northeast winds off the ice floes in the Gulf of St. Lawrence kept the air chilly and frost occurred every night in April, up to the 27th. The growth during May was slow until after the severe frost of the 17th when the weather turned warmer. Seeding began at this Station on May 12. The weather during June, July and the first half of August was dry and hot. Heavy wind and rain storms on the 15th and 19th of August did considerable damage, lodging and shelling out much grain before it was ready to cut. After continued rains for a fortnight, the first killing frost occurred on the 29th of September. A large amount of the fall ploughing was done during the exceptionally fine month of October. Over 8 inches of snow fell November 3 and remained several days. This was followed by broken weather, enough snow falling to make good sleighing during the last week of the month. The ground remained bare throughout December. January and February, 1912, were stormy and very cold. On the 10th of March a storm occurred that blocked all traffic. The ice remained good and strong and the winter's hauling is now practically completed.

CROPS ON THE EXPERIMENTAL STATION.

The hay crop was much injured by the night frosts of April and the continued drouth that followed. The western section of the Province fared much better than the eastern, while at this Station the crop was much below the average of several

years, as scarcely any clover wintered. The cereal branch of the work was very satisfactory. Seed was obtained from the members of the Canadian Seed Growers' Association in P. E. Island, and also from members in New Brunswick, and plots were grown along with the uniform test plots. These were carefully rogued by the Secretary of the Association and the Seed Inspector; notes were taken and the members were corresponded with. By this means undesirable seed can be eliminated from plots grown by any member. Multiplying plots of grain were grown at the Station. Pure strains of seed have been sold to members and to men who agree to grow such seed carefully under supervision, to report annually for three years and compare it with that already in their locality. The grain was harvested in good condition and the seed for 1912 is strong in vitality.

The potato crop was about an average in yield and quality. The potatoes have kept sound throughout the winter, there being scarcely any rot reported in this Province.

The vegetables with few exceptions gave most excellent returns. The corn was killed early by a severe frost and only gave fair yields. Roots in general did well; continuous cultivation during the drouth was necessary to secure a full crop.

EXPERIMENTS WITH SPRING WHEAT.

The following uniform test plots of spring wheat were added to the list grown in 1910 which was reported: Two lots of Red Fife from C. E. F. Ottawa, one an early strain and the other grown for the Dominion Chemist, three lots of White Fife furnished by members of the C.S.G.A., and one lot of Selected Goose wheat obtained in Ontario. The land was a sandy loam which had been manured on the sod with barnyard manure at the rate of eight tons per acre during the summer of 1910 immediately after a crop of timothy hay had been removed. The sod was full of couch and, though well worked, the couch was not all killed. The seed was sown on May 13, on one-sixtieth acre plots at the rate of about 1 bushel and 3 pecks to the acre. The plots and paths were seeded down with a mixture of 1 lb. of common Red Clover, 3 lbs. Alsike, 1 lb. White Dutch per acre, and the paths were allowed to grow up, the clover on them being cut for hay in July. The land was not uniform and the couch grass interfered with the growth of some plots more than others. Some rust occurred and the Goose wheat lodged quite badly.

Spring Wheat.—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of Straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after cleaning.
					Ins.		Ins.	Lbs.	Bush.	Lbs.	Lbs.
1	White Russian	May 13..	Aug. 17..	96	39	9½	3½	1,598	26	38	63
2	Early Red Fife	" 13..	" 15..	94	35	10	2¾	1,472	24	32	63
3	Huron	" 13..	" 15..	94	37	10	3	1,470	24	30	63.2
4	Stanley	" 13..	" 16..	95	35	10	3	1,470	24	30	62
5	Bishop	" 13..	" 12..	91	35	10	2¼	1,416	23	36	62.5
6	Pringle's Champlain	" 13..	" 17..	96	36	9¾	2	1,406	23	26	63.2
7	Goose (selected) J. L.	" 13..	" 25..	104	39	8½	2	1,395	23	15	63.8
8	White Fife (sel. D.I.A.)	" 13..	" 17..	96	38	9½	3	1,389	23	9	62.5
9	Red Fife (extra)	" 13..	" 17..	96	38	10	2½	1,384	23	4	62.5
10	Marquis	" 13..	" 12..	91	34	10	2¼	1,342	22	22	63.5
11	White Fife (sel. P.M.)	" 13..	" 17..	96	37	10	2¾	1,331	22	11	62.5
12	Chelsea	" 13..	" 12..	91	38	10	3	1,324	22	4	62.5
13	White Fife (sel. G. Mc.)	" 13..	" 17..	96	36	9¾	3	1,301	21	41	61.5
14	Preston	" 13 .	" 14..	93	38	9½	2¾	1,286	21	26	62.5
15	Red Fife	" 13..	" 17..	96	37	10	2½	1,226	20	26	62.5
16	White Fife	" 13..	" 18..	97	38	10	2½	1,159	19	19	63.0
17	Colorado Bearded	" 13..	" 14.	93	40	9	2½	992	16	32	63.0
18	Bobs	" 13..	" 14..	93	30	10	2¼	885	14	45	62.0
19	Goose	" 13..	" 23 .	102	36	8	2¼	726	12	6	62.8

FIELD LOTS OF SPRING WHEAT.

Three field plots of spring wheat were grown. The seed for one half acre of Red Fife and one quarter acre White Fife was obtained pure from Ottawa. An acre and one quarter was sown with Marquis wheat; the seed of this was obtained from Ottawa in 1910. This grain was carefully rogued during the summer, and is being sold to grain growers as foundation stock.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of Straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	
					Ins.		Ins.	Lbs.	Bush.	Lbs.
1	*Marquis	May 12..	Aug. 11..	91	38	10	2¼	1,478	24	38
2	†Red Fife	" 17..	" 21..	96	40	10	2½	1,922	32	2
3	‡White Fife	" 17..	" 21..	96	39	10	2¾	1,368	22	48

*1·25 acre, †·5 acre and ‡·25 acre.

EXPERIMENTS WITH OATS.

The land available for the uniform test plots of oats was unsatisfactory and the results are not reliable as comparative tests. The soil was a sandy loam. It received 8 tons of barnyard manure; this was spread on the sod in 1910. Several bad patches of couch interfered with the growth of many of the plots. Twenty-seven plots of one-sixtieth of an acre each, were sown on May 15 at the rate of two bushels and two pecks per acre.

OATS—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after cleaning.
					Inch.		Inch.	Lbs.	Bush.	Lbs.	Lbs.
1	White Giant	May 15	Aug. 13	90	42	9¾	8½	2861	84	5	32.2
2	Banner (Sil. T. W.)	" 15	" 11	88	43	10	8½	2794	82	6	35
3	Siberian	" 15	" 13	90	40	9½	7½	2680	78	28	34
4	Lincoln	" 15	" 14	91	41	9½	8	2674	78	22	36
5	Old Island Black	" 15	" 9	86	40	9½	9	2618	77	..	35.5
6	Swedish Select	" 15	" 12	89	42	9	6½	2597	76	13	37
7	Ligowo, Improved	" 15	" 13	90	45	10	8	2558	75	8	37.5
8	Virginia White	" 15	" 9	86	40	10	7	2535	74	19	36
9	Twentieth Century	" 15	" 13	90	46	10	8¼	2490	73	8	36.5
10	Victory	" 15	" 15	92	45	10	8½	2439	71	25	37.5
11	Daubeney, (G)	" 15	" 2	79	40	10	6	2273	66	29	33
12	Thousand Dollar	" 15	" 11	88	43	10	8½	2239	65	29	37.5
13	Golden Beauty	" 15	" 13	90	38	9	7½	2239	65	29	34.2
14	White Egyptian	" 15	" 11	88	39	10	8	2209	64	33	39.5
15	Early Blossom	" 15	" 12	89	38	9	7	2179	64	3	37.5
16	Daubeney, Sel	" 15	" 2	79	33	10	5½	2176	64	..	34.5
17	Improved American	" 15	" 13	90	40	10	8	2175	63	33	34
18	Abundance	" 15	" 13	90	40	10	8	2175	63	33	34.5
19	Gold Rain	" 15	" 12	89	41	10	7	2162	63	20	37.5
20	Wide Awake	" 15	" 14	91	37	9¾	7½	2058	60	18	35
21	Danish Island	" 15	" 12	89	41	9½	9	2052	60	12	33
22	Abundance, Gar. Reg	" 15	" 12	89	40	9½	8	2023	59	17	37
23	Pioneer (Black)	" 15	" 8	85	34	10	6½	1952	57	14	37
24	Banner	" 15	" 12	89	39	9¾	9	1928	56	24	33
25	Excelsior (Black)	" 15	" 9	86	34	9¾	7½	1906	56	2	39
26	Ligowo (Swedish)	" 15	" 11	88	38	10	6½	1789	52	21	37
27	Irish Victor	" 15	" 14	91	36	10	6½	1766	51	32	33

FIELD PLOTS OF OATS.

Selected seed was obtained from Ottawa and five field plots of oats were sown on May 20. The land received about eight tons of manure per acre the previous year. The sod was ploughed in the autumn of 1910 and many of the weeds killed by frequent discing with the cut-away harrow. The seed was sown at the rate of two bushels per acre. These plots were carefully rogued and the weeds in them were pulled. The seed from them is being sold to farmers for foundation stock.

FIELD PLOTS—OATS—Test of Varieties.

Number.	Name of Variety.	Size.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.
						Ins.		Ins.	Lbs.	Bush. Lbs.
1	Banner	2 acres	May 20	Aug. 14	86	44	9	8½	2,768	81 14
2	Daubeney	·125	" 20	" 18	90	34	9½	6	1,568	46 4
3	Victory	·25	" 20	" 18	90	42	10	8½	1,520	44 24
4	Gold Rain	·25	" 20	" 18	90	41	10	7	1,508	44 12
5	Ligowo	·25	" 20	" 18	90	39	10	7	1,468	43 6

EXPERIMENTS WITH BARLEY.

Experiments were conducted with 22 varieties of barley (12 six-row and 10 two-row) in plots of one-sixtieth of an acre each. The land had a dressing of 8 tons barnyard manure applied on the sod in 1910, after a crop of timothy hay had been removed. The plots of six-row barley were sown May 18 and the two-row on May 19, at the rate of two bushels per acre. A mixture of 6 lbs. Common Red clover, 3 lbs. Alsike, 1 lb. White Dutch and 10 lbs. Timothy seed per acre was sown on the paths and plots. The grass on all the paths about the plots was allowed to grow. It was cut for hay in July. The Swedish Chevalier was a little weak in the straw.

SIX-ROW BARLEY—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
					Ins.		Ins.	Lbs.	Bush. Lbs.	Lbs.
1	Nugent	May 18	Aug. 9	83	37	10	3	2,915	60 35	48·0
2	O. A. C. No. 21	" 18	" 7	81	37	10	2¾	2,568	53 24	46·2
3	Claude	" 18	" 7	81	33	10	2½	2,490	51 42	47 0
4	Albert	" 18	" 6	80	35	10	3¼	2,430	50 30	46·5
5	Odessa	" 18	" 7	81	36	10	2¾	2,196	45 36	47·0
6	Stella	" 18	" 7	81	32	10	2½	2,156	44 44	
7	Manchurian	" 18	" 8	82	34	10	2½	2,084	43 20	46·2
8	Oderbruch	" 18	" 9	83	32	10	2½	1,999	41 31	47·0
9	Yale	" 18	" 9	83	37	10	2½	1,909	39 37	51·0
10	Trooper	" 18	" 7	81	31	10	2	1,819	37 43	48·0
11	Mensury	" 18	" 8	82	38	10	2½	1,793	37 17	51·5
12	Mansfield	" 18	" 8	82	27	10	2¼	1,718	35 38	46·0

Two-row Barley—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
					Ins.		Ins.	Lbs.	Bush. Lbs.	Lbs.
1	Swedish Chevalier..	May. 19	Aug. 12	85	33	8	3½	2,404	50 4	52·0
2	Standwell.....	" 19	" 10	83	44	10	3½	2,195	45 35	52·5
3	Invincible..	" 19	" 11	84	38	10	3	2,175	45 15	52·4
4	French Chevalier...	" 19	" 8	81	36	10	2½	2,134	44 22	53·0
5	Danish "	" 19	" 9	82	37	10	3½	2,107	43 43	52·0
6	Canadian Thorpe...	" 19	" 10	83	38	10	3	2,078	43 14	52·5
7	Jarvis..... ...	" 19	" 9	82	48	10	4	2,021	42 5	51·2
8	Clifford.....	" 19	" 8	81	40	10	3¼	2,000	41 32	51·4
9	Beaver.....	" 19	" 7	80	46	10	4	1,970	41 2	48·0
10	Hannchen.....	" 19	" 9	82	31	9½	2	1,867	38 43	52·2

FIELD PLOTS OF BARLEY.

One-half acre of Manchurian and one-quarter acre of Hannchen barley were sown with seed obtained from the Cerealist at Ottawa. The Hannchen rusted quite badly and was weak in the straw. Heavy wind storms shook out much of the grain before harvest.

Field Plots of Barley—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points,	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.
					Ins.		Ins.	Lbs.	Bush. Lbs.
1	Manchurian (area, ·5 acres)..	May 29	Aug. 18	81	34	10	2½	1,604	33 20
2	Hannchen (" ·25 ")..	" 29	" 21	84	28	6	2	1,440	30 00

EXPERIMENTS WITH PEAS.

Twelve varieties of peas were tested on one-sixtieth acre plots. The land was a sandy loam; it had grown a heavy crop of oats in 1910. It was manured and a crop of potatoes grown on it in 1909. After being well worked with the cut-away harrow the plots were sown on May 24 at the rate of two bushels per acre. The vines made a very strong growth early in the season and good harvest weather ripened the plots quite uniformly. The peas were injured somewhat by the pea moth (*Semasia nigricana Stepp.*) which for years has been very abundant in this Province.

PEAS—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average length of pod.	Yield of Grain per acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
						In.	Lbs.	Bush. Lbs.	Lbs.
1	Prince	Large	May 24	Aug. 31	99	2 1/2	3,148	52 58	61·8
2	Prussian Blue	Medium	" 24	" 31	99	2 1/4	3,073	51 13	62·2
3	White Marrowfat	Large	" 24	" 31	99	2 1/2	2,924	48 44	61·5
4	Black-eye Marrowfat	Medium	" 24	" 31	99	2 1/2	2,840	47 20	61·8
5	Picton	"	" 24	" 31	99	2 1/2	2,684	44 44	62.2
6	Golden Vine	Small	" 24	" 31	99	2	2,649	44 9	65·5
7	Paragon	Medium	" 24	" 31	99	2 1/2	2,641	44 1	62·5
8	English Grey	"	" 24	" 31	99	2 1/2	2,632	43 52	60·0
9	Daniel O'Rourke	Small	" 24	" 31	99	2 1/4	2,544	42 24	63·0
10	Arthur (Sel.)	Medium	" 24	" 23	91	2 1/4	2,511	41 51	62·0
11	Mackay	"	" 24	Sept. 2	101	2 1/2	2,388	39 48	61 5
12	Chancellor	Small	" 24	Aug. 25	93	2	2,237	37 17	63·0

EXPERIMENTS WITH CEREALS ON SWAMP LAND WITH DIFFERENT APPLICATIONS OF LIME.

A portion of a black muck swamp underlaid with 3 feet of peat which had been tile drained in 1910 was laid off into one-fortieth acre plots and sown with buckwheat at 1 1/8 bushels per acre, wheat at 1 3/4 bushels, oats at 2 1/2 bushels per acre, barley at 2 bushels per acre, peas at 2 bushels per acre and vetches at 1 bushel per acre on June 17. The clearing and burning had prevented earlier seeding. The land was laid off into four strips 33 feet wide each, parallel with the road to St. Avards. These strips were treated as follows:—

No. 1. Had no application of lime.
No. 2. Had 5 bbls. lime per acre.
No. 3. Had 10 bbls. lime per acre.
No. 4. Had 20 bbls. lime per acre.

Each kind of grain was sown across these strips making each plot of the experiment one-fortieth of an acre in area. Certain irregularities will be noticed, as large piles of brush and stumps had been burned on the ground, leaving under them a considerable quantity of potash, etc., which neutralized the swamp acids and gave bunches of strong, healthy grain. The peas and vetches started well, then died down and did not mature.

TEST OF LIME ON SWAMP—Cereals Grown 1st year after Clearing.

Number.	Name of Cereal.	Date of Sowing.	Date When Cut.	No. of Days Maturing.	Bbls. of Lime per acre	Condition When Cut.	Plots influenced by ashes of stumps.	Total Yield of Grain and Straw per acre.	Yield of Grain per acre.	
							Amount	Lbs.	Bush.	Lbs.
Plot 1	Buckwheat	Jun 17	Sep 7	82	none	½ Ripe	none	3800	14	8
" 2	"	17	" 7		5 bbls.	"	marked	5133	17	11
" 3	"	" 17	" 7		10 "	"	slight	5133	15	.
" 4	"	" 17	" 7		20 "	"	none	5400	20	26
" 1	Wheat (White Fife)	" 17	" 8	83	none	Soft	marked	3300	14	20
" 2	"	" 17	" 8		5 bbls.	"	"	3340	15	20
" 3	"	" 17	" 8		10 "	"	slight	3330	15	10
" 4	"	17	" 8		20 "	"	none	2300	9	50
" 1	Oats (Banner)	" 17	" 8	83	none	Ripe	marked	1820	19	14
" 2	"	" 17	" 8		5 bbls.	"	slight	2240	25	10
" 3	"	" 17	" 8		10 "	"	none	3120	24	24
" 4	"	" 17	" 8		20 "	"	"	4500	49	14
" 1	Barley	" 17	" 4	79	none	"	slight	130	..	40
" 2	"	" 17	" 4		5 bbls.	"	none	1560	11	42
" 3	"	" 17	" 4		10 "	"	"	1440	10	30
" 4	"	" 17	" 4		20 "	"	"	3000	23	36
" 1	Rye	" 17	" 8	83	none	Soft	"	180	1	24
" 2	"	" 17	" 8		5 bbls.	"	"	960	5	20
" 3	"	" 17	" 8		10 "	"	"	1080	7	48
" 4	"	" 17	" 8		20 "	"	"	4200	27	6

EXPERIMENTS WITH INDIAN CORN.

Ten varieties of Indian corn were grown for ensilage. Eight tons of manure per acre was applied to sod in 1910, this was ploughed under and well worked. Three tons of manure was applied before planting and worked into the soil with the disc harrow. The corn was sown with a grain drill in rows thirty-six inches apart, on June 7, 1912, and cut green on September 21, shortly after a heavy frost which had killed it. It was cured as corn stover and fed to stock during the winter.

The yields were computed from two inside rows, the plots being one-hundredth of an acre in area.

INDIAN CORN FOR ENSILAGE—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when cut.	Weight per Acre grown in rows.	
				In.		Tons.	Lbs.
1	Superior Fodder	June 7	Sept. 21	90	In silk	18	..
2	Compton's Early	" 7	" 21	75	Tasselled	15	1,000
3	Woods' Northern Dent	" 7	" 21	84	In silk	13	1,100
4	Early Mastodon	" 7	" 21	69	In silk	13	.
5	Longfellow	" 7	" 21	72	Early milk	12	100
6	Angel of Midnight	" 7	" 21	72	Soft glazed	11	1,700
7	Eureka	" 7	" 21	81	Tasselled	11	1,300
8	Selected Leaming	" 7	" 21	78	Tasselled	10	1,700
9	Canadian Yellow, (Sel. N.S.C.A.)	" 7	" 21	58	Firm dough	10	100
10	Longfellow (Sel. F. G.)	" 7	" 21	58	Early dough	7	800

FIELD ROOTS.

EXPERIMENTS WITH TURNIPS.

Thirteen varieties of Swede turnips were tested on a clay loam. This land appeared to be dry but proved to be in need of drainage. The soil baked during the hot weather of July and August and then was too wet when the rain came later in the season. A timothy sod was top-dressed in August, 1910, with 8 tons barnyard manure and ploughed under; this was well worked in the spring and 10 tons additional manure was worked into the land. The seed was sown in drills two and one half feet apart and the young plants thinned to about fourteen inches apart in the rows. The seed was sown May 22 and the roots pulled on November 9. The yields were computed from one-hundreth acre plots.

TURNIPS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre 1st Sowing.		Yield per Acre 1st Sowing.	
		Tons.	Lbs.	Bush.	Lbs.
1	Webb's (Home-grown)	17	1,400	590	..
2	Hall's Westbury	15	775	512	55
3	Good Luck	15	125	502	5
4	Magnum Bonum	15	100	501	40
5	Hazard's Improved	13	1,300	455	..
6	Mill Pond	13	1,100	451	40
7	Jumbo	13	1,025	450	25
8	Hartley's Bronze	13	775	446	15
9	Perfection Swede	13	675	444	35
10	Halewood's Bronze Top	13	50	434	10
11	Bangholm Selected	12	1,825	430	25
12	Carters' Elephant	12	1,350	422	30
13	Mammoth Clyde	11	1,050	384	10

EXPERIMENTS WITH CLUB-ROOT OF TURNIPS.

Experiments outlined by the Division of Botany, C.E. Farm.

Land that was badly infested with 'Club Root' in 1910 was chosen. It was divided into plots of 1/20 of an acre from west to east.

Plot I, received no treatment.
Plot II, received 150 bushels unslaked lime per acre.
Plot III, " 100 " " "
Plot IV, " 75 " " "

These were sown in sections of 1/60 acre each from north to south.
Section 1. Sown June 30, 1911.
Section 2. Sown June 15, 1911.
Section 3. Sown June 1, 1911.

Hall's Westbury was the seed sown on all plots. They were harvested November 11, 1911. Barnyard manure at the rate of 20 tons per acre was applied.

Plot No.	Section.	Sound Turnips.		Diseased Turnips.		Rotten Turnips.		Total Turnips.	
		Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.	Lbs.	Ozs.
1	No 1	373	4	272	..	16	4	661	8
1	" 2	179	..	438	12	5	4	623	..
1	" 3	168	..	568	..	24	8	760	8
								2,045	..
2	No. 1	571	8	221	..	...	9	793	1
2	" 2	632	..	89	..	...	..	721	..
2	" 3	800	..	156	8	15	9	972	1
								2,486	2
3	No. 1	723	14	74	..	...	..	797	14
3	" 2	741	15	126	..	1	1	869	..
3	" 3	867	..	123	12	4	14	995	10
								2,662	8
4	No. 1	669	..	212	12	1	1	882	12*
4	" 2	580	..	300	8	33	..	913	8
4	" 3	575	..	39	..	...	..	614	..
								2,410	..
	Sections	1		2		3			
	Totals	Lbs. 3,135	Ozs. 3	Lbs. 3,126	Ozs. 8	Lbs. 3,342	Ozs. 3	Lbs. 9,603	Ozs. 14

*Plot 4, Section 1 had the outside row completely killed by "Club Root," the lime was harrowed in from this row.

CLUB-ROOT EXPERIMENT—Test of Varieties.

SEASON, 1911.

No.	Name.	Sound Turnips.			Diseased Turnips.			Rotten Turnips.			Total Turnips.		
		No.	Lbs.	Oz.	No.	Lbs.	Oz.	No.	Lbs.	Oz.	No.	Lbs.	Oz.
1	Bangholm Selected	4	10	13	3	7	7	10	6	12	17	24	9
2	Carter's Elephant	2	7	13	16	33	5	16	14	73	34	55	9
3	Good Luck	6	18	2	46	119	8	41	39	..	93	176	10
4	Halewood's Bronze Top	2	6	1	14	36	..	40	48	..	56	90	1
5	Hall's Westbury	9	39	11	40	97	12	27	35	..	76	172	7
6	Hartley's Bronze	70	223	4	25	43	2	11	17	..	105	283	6
7	Jumbo	0	.....		21	51	4	39	56	8	60	107	12
8	Magnum Bonum	13	65	9	18	72	8	34	61	..	65	199	11
9	Mammoth Clyde	0	.....		3	8	13	46	59	..	49	67	13
10	Perfection Swede	39	148	5	6	25	11	23	31	..	68	205	..
11	Webb (P.E.I. Seed)	21	74	9	10	22	..	31	38	..	62	134	9
12	Hazard's Improved Cr	0	.....		4	5	4	15	22	2	19	27	6
13	Mill Pond	0	.....		8	10	3	26	18	8	24	28	11
14	" "	0	.....		2	4	15	10	11	2	12	15	15
15	" "	0	.....		16	26	8	17	17	7	33	43	15

The above varieties were sown on June 30, on land which was known to be very badly infested with 'Club-root.' The turnips grown on it in 1910 were almost all

diseased. The variety known as Mill Pond was recommended to me as being immune. I gave it three rows and the results are recorded above.

In 1910 No. 8 was 1st, No. 3, 2nd, No. 6, 3rd, and No. 10, 9th, in a similar test.

EXPERIMENTS WITH MANGELS.

Eight varieties of mangels were sown on May 15 on land that had grown turnips in 1910. Fifteen tons of manure was thoroughly worked into the soil and the seed sown in drills thirty inches apart. The young plants were thinned to about 12 inches apart in the rows. The yields were computed from one-hundredth acre plots. The plots were pulled October 14.

MANGELS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre — 1st Sowing.		Yield per Acre — 1st Sowing.	
		Tons.	Lbs.	Bush.	Lbs.
1	Selected Yellow Globe	36	1,103	1,218	23
2	Giant Yellow Globe	36	633	1,210	33
3	Yellow Intermediate	34	268	1,137	48
4	Gate Post	34	161	1,136	1
5	Giant Yellow Intermediate	33	...	1,100	..
6	Perfection Mammoth Long Red	31	1,366	1,056	6
7	Prize Mammoth Long Red	31	1,327	1,055	27
8	Half Sugar White	31	171	1,036	11

EXPERIMENTS WITH FIELD CARROTS.

Five varieties of carrots were tested on land that had grown potatoes in 1910. The land was prepared in the same way as for the other roots. The yields were computed from one-hundredth acre plots. The seed was sown May 15, and the roots pulled October 20. The yields were disappointing compared with the tops, which were very strong.

CARROTS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre — 1st Sowing.		Yield per Acre — 1st Sowing.	
		Tons.	Lbs.	Bush.	Lbs.
1	Mammoth White Intermediate	10	909	365	9
2	Improved Short White	9	1,275	321	15
3	Half Long Chantenay	8	1,696	296	36
4	Ontario Champion	8	1,097	286	37
5	White Belgian	8	889	281	20

EXPERIMENTS WITH SUGAR BEETS.

Three varieties of sugar beets were sown under the same conditions as the mangels and in rows alongside of them. They were grown to ascertain their sugar

content, which, from the analysis made by the Dominion Chemist and included in the following table, shows that the beets were of very good quality and high in sugar. They were sown May 17 and pulled October 14.

SUGAR BEETS—Test of Varieties.

Number	Name of Variety.	Yield per acre, 1st Sowing.		Yield per acre, 1st Sowing.		Yield per acre, 2nd Sowing.		Yield per acre, 2nd Sowing.	
		Tons	Lbs.	Bush	Lbs.	Tons	Lbs.	Bush.	Lbs.
1	French Very Rich	21	438	707	18	16	452	540	52
2	Klein Wanzleben	20	1794	696	34	16	1888	564	48
3	Vilmorin's Improved	17	848	580	48	17	1719	595	19

PARTICULARS RE SUGAR CONTENT.

—	Vilmorin's Imp'd.		Wanzleben.		Very Rich.	
	Sown May 17	Sown June 5	Sown May 17	Sown June 5.	Sown May 17.	Sown June 5
Average weight one root.	1 lb.11 oz.	1 lb.10 oz.	2 lbs.4 oz.	1 lb.12 oz.	1 lb.9 oz.	1 lb.15 oz.
Total solids in juice	21·24	19·64	18·64	18·44	18·17	16·04
Sugar in juice	18·36	17·09	16·91	16·34	16·41	13·98
Coefficient of purity	86·4	87·0	90·7	89·1	90·3	87·1

EXPERIMENTS WITH POTATOES.

Nothwithstanding the long continued drought of the early summer the potato crop was about an average one in yield. The potatoes were of excellent quality and were free from rot. Scarcely any specimens have rotted in the cellars.

A strong growth of alfalfa was turned down and the land thoroughly worked two weeks before the potatoes were planted in a sandy loam that was quite mellow. A complete fertilizer at the rate of 800 lbs. per acre was applied to the surface after the seed was planted and harrowed in. It was mixed as follows: 250 lbs. nitrate of soda, 350 lbs. superphosphate and 200 lbs. muriate of potash.

The potatoes were planted May 23 and dug October 2. The yields were computed from one two-hundred-and-fortieth acre plots. The seed was cut with two eyes in each set and soaked in a solution of formalin of 1 pint to 40 gallons water for one half an hour. The potatoes were planted in rows 30 inches apart, the sets being one foot apart in the rows. The freshly cut sets were covered with slaked lime.

The plants received five sprayings with Paris green and on July 27, August 10 and August 24 the Bordeaux mixture was added to prevent blight.

Not Liming vs. *Liming (freshly cut Sets).*

A duplicate was planted with each of the variety test plots. The only change made was that the liming of the freshly cut sets was omitted.

Fifteen varieties showed an average loss of 31 bushels 47 lbs. (per acre).

Six varieties showed an average gain of 26 bushels 34 lbs. (per acre).

Net average loss on the 21 varieties, 15 bushels 49 lbs. (per acre).

POTATOES—Test of Varieties

Number.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Bliss Triumph	330	49	330	49	309	39	21	10	Round pink
2	Burbank's Seedling	308	..	308	..	283	48	24	12	Long white
3	American Wonder	305	15	305	15	261	48	43	27	" "
4	Clark's No. 1	299	12	299	12	283	48	15	24	" "
5	Money Maker	289	51	289	51	256	18	33	33	Round "
6	Late Puritan	279	57	279	57	244	12	35	45	Long "
7	Carman No. 1	261	48	261	48	233	12	28	36	Round "
8	McIntyre	243	39	243	39	213	24	30	15	Long blue
9	Dreer's Standard	238	42	238	42	217	48	20	54	Round white
10	Vick's Extra Early	232	32	232	32	202	24	29	58	Long "
11	Morgan Seedling	223	1	223	1	187	..	36	1	" "
12	Rochester Rose	213	24	213	24	182	19	31	5	" pink
13	Ashleaf Kidney	209	49	209	49	184	48	25	1	Round white
14	Reeves' Rose	207	54	207	54	159	30	48	24	Long pink
15	Factor	207	54	207	54	152	21	55	33	" white
16	Empire State	207	21	207	21	184	48	22	33	" "
17	Dalmeny Beauty	198	50	198	50	156	12	42	38	Oval "
18	Gold Coin	195	31	195	31	182	36	12	55	Round "
19	Hard to Beat	193	52	193	52	146	18	47	34	" "
20	Irish Cobbler	167	45	167	45	144	55	22	50	" "
21	Everett	141	21	141	21	122	55	18	16	Oval "

FORAGE CROPS.

Four and one half acres of new meadow produced nine tons, fourteen hundred and sixty lbs. of timothy hay, the clover having been killed out during the frosts of April. One and three quarter acres of three year old meadow gave three tons sixteen hundred and eighty five lbs. timothy hay. One and one half acres of the Beer property (not yet transferred to the Experimental Station) gave ten hundred and seventy lbs. of very weedy hay.

Three quarters of an acre of alfalfa sown July 16, 1910, gave a yield in 1911 of one ton six hundred and sixty pounds. The other plots of clover and alfalfa were so badly winter-killed that they were ploughed up.

One sixth of an acre of Western Woltz grass (Italian Rye grass) was sown May 16, 1911. It was cut August 9 giving a yield of five hundred and seventy-two pounds, equal to one ton fourteen hundred and thirty two pounds per acre. When cut the grass was ripe, the harrow was run over the plot on August 16, to cover what had shelled out, and a strong second crop sprung up which appears to have come through the winter well.

Three bushels of seed were threshed from this plot of annual grass on Aug. 12. The grass was of fine quality and made fairly good hay.

BUILDINGS.

A basement barn 40 ft. x 60 ft. with an eight-foot basement and a 16 ft. post was built 50 feet to the west of the machine shed. The foundation of the barn including a fruit cellar under the south approach and a root cellar under the north approach, was made of concrete. The superstructure is of wood, the frame above the basement being entirely constructed of planks. The gambrel roof, which is supported by plank trusses, is boarded in with six-inch boards laid three inches apart. Cedar shingles on the roof are laid four and one-half inches to the weather so that two rows of nails come on each board.

The basement has six horse stalls, four steer pens, a lavatory, a harness-room and a work shop. On the barn floor there is a large hay mow on the east of the driveway, while on the west there is a feed room, a sample room, a granary and a threshing floor. Above there is a large straw-mow 30 x 40 feet.

A compact, roomy foreman's house 28 x 32 feet was constructed to the east of the Superintendent's residence. This house was designed to illustrate a compact farm house with many useful conveniences that have only to be seen to be appreciated.

TILE DRAINAGE.

The system of tile drains commenced the previous season near the De Blois Road at the north of the farm was completed by laying 5,800 feet of 3-inch laterals to the main drain leading north. These drains were laid on 33-foot centres and drained 4·4 acres of land.

GENERAL WORK.

The lawns and roads have been much improved and several new roads were made which save labour and add to the convenience of visitors. The pond at the De Blois Road was graded and sand hauled and mixed with the brick clay to make it tillable.

HORSES.

No change was made among the horses during the year. There are three draft horses, one carriage horse and a draft colt. All have been in good condition throughout the year.

STEERS.

Two steers were purchased January 1, 1912, in order that the roughage produced right be used on the farm. During the 90 days to March 30, their average gain was two lbs. each per day.

EXPERIMENT IN FATTENING LAMBS.

Thirty lambs were purchased and a test conducted to gain information regarding the value of roughage in fattening lambs. The lambs were grade Leicesters in good, thrifty condition, but were badly infested with ticks. They were dipped a few days before the test began and once during the test and this set them back considerably. On the morning of January 1, 1912, they were put on test. The experiment continued 90 days.

Each lamb of each group received 4 ozs. of grain, (oats, barley and peas equal parts) the first day. This was increased at the rate of one hundreth of a lb. per lamb per day throughout the whole period with Lot 1, while Lot 2 and 3 received the same increase as long as they would take it. Lambs Nos. 13, 17, 21 and 22 had a distemper for a time and went off their feed. This reduced their grain ration. These two lots were fed all the grain they would eat.

As roughage, Lot 1 were given alfalfa clover hay; Lot 2 were fed as much mixed hay (80 per cent. timothy) and corn stover as they would eat. They began with about equal parts of hay and stover for January. During February they ate three parts hay to four parts corn stover, while in March they dropped off from the corn stover until at the close they ate four parts hay to one of stover. Lot 3 were fed what timothy hay and turnips they would take in the proportion of about 7 of hay to 8 of roots.

The lambs were fed about 8 a.m., at noon and about 5 o'clock in the evening. They ate very little of their bedding, which was of oat straw.

LAMB FEEDING EXPERIMENTS—Table of Weights and Gains—A. .

Tag Number.	First Weight.	Last Weight.	Total Gain.	Daily Gain per Lamb.
Lot. 1.	Lbs.	Lbs.	Lbs.	Lbs.
No. 1	103½	124¾	21¼	·24
2	107½	135	27½	·30
3	92	100¾	8¾	·09
4	86¾	102¼	15½	·17
5	83	100½	17½	·19
6	80½	88¾	8½	·09
7	80¼	92¼	12	·13
8	75¼	97	22¼	·24
9	69	85¼	16¼	·18
10	70½	83	12¼	·13
Total	858¼	1,019½	161¾	1·76
Average	85·8	101·9	16·1	·17
Lot 2.				
No. 11	101½	113½	12	·13
12	98	114½	16½	·18
13	89¼	89½	¼	....
14	90¾	98½	7¾	·08
15	84½	94½	10	·11
16	79½	81¼	1¾	·02
17	85	85¼	¼	....
18	79¾	85¼	6¾	·07
19	74	85¾	11¾	·13
20	70½	81	10½	·11
Total	852¾	929¼	77½	·83
Average	85·2	92·9	7·7	08

LAMB FEEDING EXPERIMENTS—Table of Weights and Gains—A—*Continued.*

Tag Number.	First Weight.	Last Weight.	Total Gain.	Daily Gain per Lamb.
Lot 3.				
No. 21	75	74	*1	....
22	79	80½	1½	·01
23	79½	90½	11	·12
24	82	88¼	6¼	·07
25	85	99	14	·15
26	88	107	19	·21
27	74½	82¾	8¼	·10
28	84	90¼	6¼	·07
29	68	78¾	10¾	·11
30	74¼	79	4¾	·04
Total	739½	869¼	80¼	·88
Average	78·9	86·9	8	·68

TABLE OF WEIGHTS AND GAINS—B.

Date of Weighing.	Lot 1.		Lot 2.		Lot 3.	
	Total Weight by Lots.	Gain per Lamb per Day.	Total Weight by Lots.	Gain per Lamb per day.	Total Weight by Lots.	Gain per Lamb per Day.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
January 1	358¼	....	852¾	·03	789½	....
" 20	847¼	·05*	858	·09	794¾	·02
February 19	874¼	·12	878¾	·09	813	·09
March 1	932	·34	897	·08	798	·07*
" 20	989¾	·34	913¾	·15	848¾	·26
" 30	1,019⅓	·29	929¼	....	869¾	·21
		1·09		·44		·58

NOTE.—* Indicates loss.

GENERAL STATEMENT.

CLOVER HAY VS. MIXED HAY AND CORN STOVER VS. TIMOTHY HAY AND TURNIPS.

	Lot 1.	Lot 2.	Lot 3.
Number of lambs	10	10	10
Number of days in experiment	90	90	90
Total weight at beginning of experiment	858¼	852¾	789½
Total weight at end of experiment	1019½	929¼	869¾
Gain per period	161¼	76½	80¼
Gain per head	16	7½	8
Gain per head per day	·18	·085	·09
Quantity of grain eaten by lot for period	597	586	480
Quantity of clover hay " "	2682	....	....
Quantity of timothy hay " "	....	....	1492
Quantity of mixed hay " "	....	1384	...
Quantity of corn stover " "	....	1491	....
Quantity of turnips " "	....	....	1836
Total cost of feed	$15.36	$12·09	$11·85
Cost of feed per head	1.53	1·20	1·18
Cost of feed per head per day (cents)	1.07	1·34	1·18
Cost to produce a lb. of gain (cents)	9.05	18·6	14·75
Value of lambs at commencement at 4½c per lb. live weight	38·62	38·37	35.53
Value at commencement plus cost of feed	53·98	50·46	47.38
Sold at 6c per lb. live weight	61·17	55·75	....
Sold at 5c " "	....	....	43 49 -
Net profit on lot	7·19	5.29	3·89*
Net profit on lamb	·71	·53	·39*

* Loss.

In calculating cost of feeding the following prices were charged:—

Roots (turnips)	$2.00 per ton.
Corn stover	2.00 "
Hay (clover)	7.00 "
Hay (mixed)	7.00 "
Hay (timothy)	7.00 "
Grain (mixed)	20.00 "

The test would indicate the very valuable feeding qualities of clover hay for fattening lambs. The demand for fat lambs in April exceeds the supply.

HORTICULTURE.

Quite a large percentage of the Experimental Station area is devoted to horticulture.

LARGE FRUITS.

The orchards of large fruits made excellent growth and wintered well. A few trees in the old orchard bore a medium crop of excellent apples. Two applications of lime-sulphur spray cleaned off many of the bark insects from these trees.

SMALL FRUITS.

A number of the small fruits came into bearing. The purple and red raspberries produced good fruit of large size. The black-cap raspberries were badly injured by anthracnose and most of them will have to be destroyed. Nine varieties of grapes produced clusters that matured. Currants, gooseberries and strawberries gave fair returns.

TREES AND SHRUBS.

The belt of ornamental trees and shrubs was completed along the railway front and many varieties were added to the lawns and driveways.

VEGETABLES.

The vegetable garden is situated opposite the residence near the Mount Edward Road. A great many varieties of the common vegetables were tested. This garden proved to be of great interest to visitors and much valuable information has been gained from it.

RECORDS.

A very complete system of horticultural records was commenced in the spring of 1911. Every tree, shrub, vegetable and flower is examined from time to time throughout the year, and notes recorded giving annual growth, hardiness, general condition, diseases and other items. Among these are many minute details which apply to the different classes, as the dates the flowers open, their period of full bloom and when their bloom is over. These are at the Experimental Station at Charlottetown where they may be examined by those interested. Copies are sent annually to the Central Experimental Farm at Ottawa.

FLOWERS.

The flowers, to many, are the most attractive feature on the Farm. Throughout the whole season, from when the snow left until its return, a most beautiful display of choice flowering plants greeted every one who visited the Station buildings. Many hundreds of the choicest varieties of tulips, narcissi, and crocuses, with squills and other bulbs, sent up their delicate flowers during the early spring.

A four-foot border of annuals extends most of the way from the residence to the Mount Edward Road. On the eastern lawn are groups of perennials comprising irises, paeonies, roses, asters, dahlias and many others which make a beautiful showing, while back of them fifty or more varieties of sweet peas make a veritable wall of beauty until the late autumn. In the pond to the west of the buildings varieties of southern water lilies brighten the surface, while around the edge Japanese irises have been planted. In all, more than four hundred perennials or groups of annuals were grown.

AGRICULTURAL MEETINGS AND FARMER'S INSTITUTE PICNICS.

A number of addresses were given at Farmers' Institute Meetings. The attendance at these meetings showed a marked increase over last year. I spoke at a very large Annual Institute Picnic held at Augustine Cove on July 13, and at the York Institute Banquet, February 21, 1912.

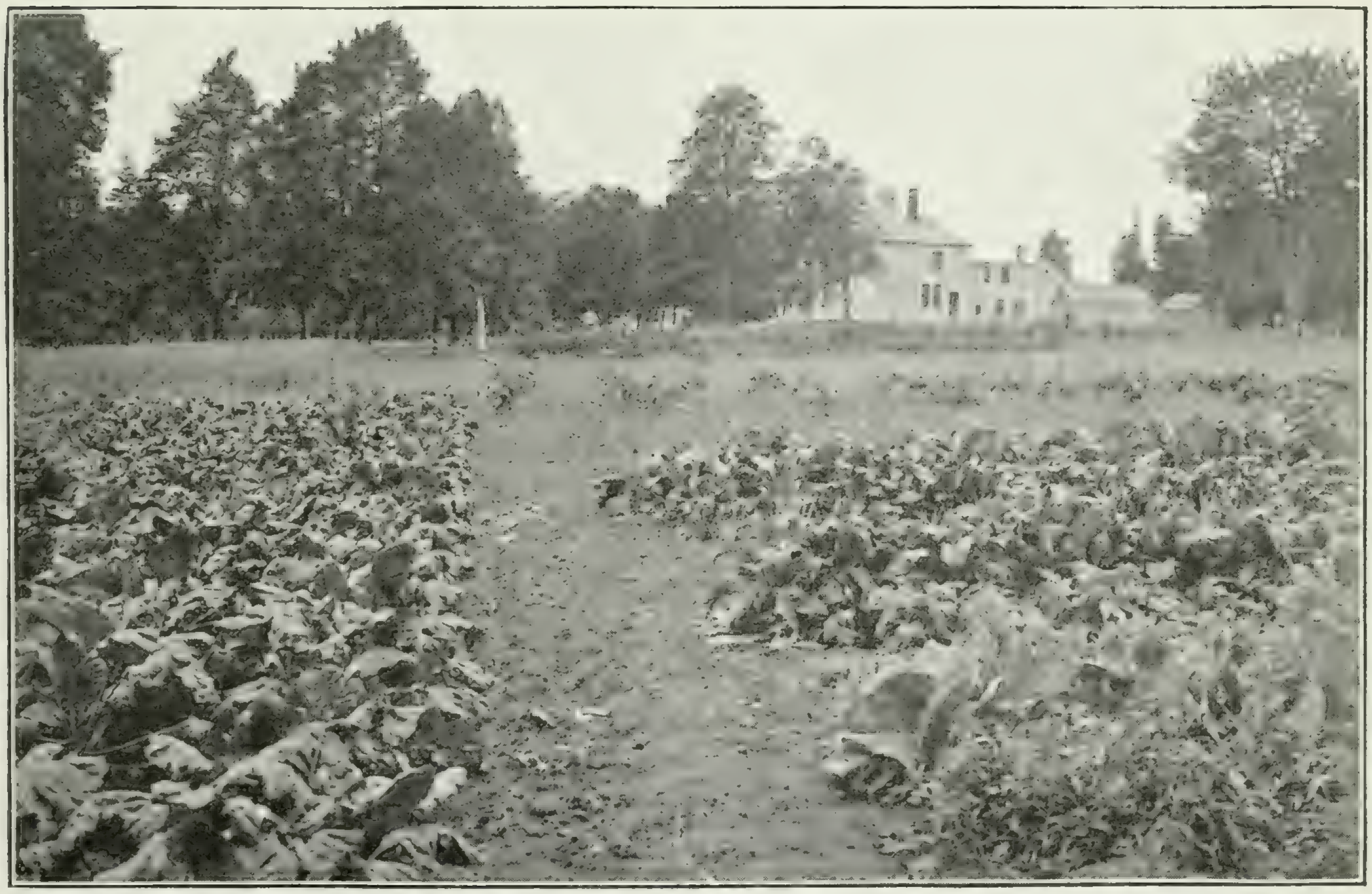
EXHIBITIONS.

The Dominion Botanist assisted in making a very creditable display from the Experimental Station at the Provincial Exhibition held at Charlottetown, P.E.I., September 25-29, 1911.

I attended the Prince County Exhibition September 22-23, judged at the Egmont Bay and Mt. Carmel Institute Exhibition October 11 and the Tracadie Exhibition November 6, 1911.



The Barn, Experimental Station, Charlottetown, P.E.I.



The Superintendent's House and part of Vegetable Garden, Experimental Station, Charlottetown, P.E..I

SEED FAIRS.

Owing to illness I was obliged to cancel my engagements to judge at the four Seed Fairs held in the Province in March. I asked that Mr. LeLacheur be invited to take my place which he did. I was able to be at the Central Seed Fair held in Charlottetown, March 13 and 14, which closed a series of the best Seed Fairs yet held in the Province.

INVESTIGATION WORK THROUGHOUT THE PROVINCE.

I visited many of the farms within driving distance of the Station and consulted with the owners regarding problems that were of general interest; surveying for drainage in some instances; rogueing plots of special seed grain they had purchased from the Station, or taking up with them any problems they suggested.

On June 17-19, I accompanied the Dominion Horticulturist and Dr. Malte on an extended tour over the central portion of the Province, examining the native flora and investigating the almost total loss of the clover crop. We were unable to find a year old Red clover plant sound at the crown. Disease had weakened all examined. In most cases the tap root was dead and secondary roots had been put forth.

From September 19 to 24, I accompanied the Dominion Botanist investigating in the east the destruction of the balsam fir, and in the west, the cherry disease. We travelled from Charlottetown to Orwell, through a territory badly injured and found in every instance that the trouble of the balsam fir was due to a borer. Specimens were collected and sent to the Dominion Entomologist. From Orwell in the east to Alberton in the west we examined cherry orchards. With but few exceptions we found a fungus (cherry spot) attacking the cherry leaves, causing them to drop in June and July. We found many orchards killed out, others partly destroyed. By burning the dead leaves and rubbish in the autumn and by spraying thoroughly in the spring, with lime-sulphur, this disease can be controlled.

TRURO SHORT COURSE.

I gave assistance and instructions during the short course at the Truro Agricultural College from January 2 to 12, 1912.

CONVENTIONS.

I attended the Prince County Institute Convention July 11, 1911, the Central Farmers' Institute Convention November 28 and 29, and also the Provincial Fruit Growers' Association and the Provincial Dairymen's Association, which met in the City of Charlottetown.

When in Ottawa at the conference of Superintendents called by the Minister of Agriculture, I attended the Forestry Convention, the Seed Growers' Association, the National Live Stock Association, and the Dominion Fruit Growers' Conference.

DISTRIBUTION OF POTATOES AND SEED GRAIN.

Ninety-three samples of potatoes were sent out in April of 1911.

Seventeen lots of Marquis seed wheat were sold to farmers for seeding in 1911; in March, 1912, twenty four bushels of Marquis wheat was forwarded to the Cerealist at Ottawa for distribution.

CORRESPONDENCE.

During the year, 1,013 letters were received and 909 sent out, not including circulars.

VISITORS

The number of visitors to this Station increased in 1911 and arrangements are being made for still larger numbers in 1912.

METEOROLOGICAL RECORDS.

Months.	Temperature—Fahrenheit.					Rainfall.		Snowfall.		Total Precipitation.	Bright Sunshine.
	Maximum.		Minimum.		Monthly Mean.						
1911.	Date.	°	Date.	°	°	Days.	Ins.	Days.	Ins.	Ins.	Hrs.
April	28	74·7	3	9·0	35 ·90	6	0·71	1	2	·93	196·2
May	22	83	17	28	53·19	6	·32	.....	.....	·32	264·5
June	19	79	4	34·5	58·57	12	2·91	.....	.....	2·91	220·7
July	6	87	8	52·5	68·97	13	1·42	.....	.....	1·42	292·7
August	5	87	31	45	66·00	13	3·36	.....	.....	3 36	253·5
September	4-11	73	29	32	55·26	21	6·26	.....	.....	6·26	154·3
October	23	64	29	27	44 47	7	1 20	2	1·75	1·37	150·7
November	13	58·5	27	13	33 71	12	4·50	7	20·9	6 39	66·6
December	12	53·0	29	7	28 70	5	1·17	9	6·7	1·34	57·7
1912.											
January	9	43	27	-14·5	12·51	4	.47	19	29·8	3·45	128·3
February	22	42·5	11	-16	17·38	1	·58	16	50	5·58	118·1
March	16	48·5	6	- 9·2	25·88	7	1·31	12	23·22	3·63	149·6
Total Annual	.....	.....	.....	.....	.....	107	24·01	66	134·35	37·46	2053·4

I have the honour to be, sir,
Your obedient servant,

J. A. CLARK,
Superintendent.

EXPERIMENTAL FARM FOR NOVA SCOTIA

REPORT OF R. ROBERTSON, SUPERINTENDENT.

NAPPAN, N.S., March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith my report of the operations on the Experimental Farm for Nova Scotia, at Nappan, N.S., for the year ending March 31, 1912.

The spring of 1911 opened bright and cold, with some snow and frost throughout April, and much less then the usual rainfall through May, resulting in a decidedly light crop of hay and grass.

Seeding operations began on this Farm May 10, but owing to the continued dry weather, none of the crops made satisfactory progress until the latter part of June. From this out, weather conditions were quite favourable for crop-growing. Timely rains coming from July 15 until the end of August, with an unusual amount of high temperature, fairly good grain crops were the result.

Harvest was earlier than usual with weather conditions good during August.

September, as usual here, was a wet month with some frost, the first being on the 15th, when 5 degrees was registered.

October was a fine month and very suitable for the gathering of roots and fruit, both of which crops were satisfactory. Frost was experienced on fourteen different dates during this month, and snow on the 27th.

November was a month of dull weather, with frequent rains and snowfalls, making late harvesting of roots slow and disagreeable. Frost was recorded on all but seven days during the month, the lowest being 13 degrees on the 26th.

December was quite seasonable and somewhat colder than usual.

January was also unusually cold, and for the most part fair, as was also the month of February.

March was somewhat milder, with more broken weather.

ACKNOWLEDGMENTS.

I wish to acknowledge, with thanks, the valuable services of Mr. Thomas Coates, farm foreman, who has been responsible for the keeping of all records in connection with the uniform test plots, and of Robert Donaldson, herdsman, who has taken complete charge of the feeding and care of all classes of live stock.

TESTS OF VARIETIES.

EXPERIMENTS WITH SPRING WHEAT.

Eleven varieties of spring wheat were sown, in uniform test plots of one fortieth acre each, the land being a heavy clay loam on which roots had been grown the previous year, and manure applied for that crop. This was ploughed in the fall of 1910, well worked up in the spring, and sown May 10, at the rate of 1¾ bushels per acre; 10 lbs. clover and 12 lbs. timothy were also sown with this crop.

The following were the yields obtained:—

SPRING WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after Cleaning.
				Ins.		Ins.	Lbs.	Bush. Lbs.	Lbs.
1	Pringle's Champlain	Aug. 12	94	44	10	3	2,520	42 ..	63·0
2	Huron	" 12	94	43	10	3	2,440	40 40	64 0
3	White Fife	" 14	96	48	10	3½	2,440	40 40	61 5
4	Preston	" 12	94	44	8	3¼	2,400	40 .	63·5
5	Stanley	" 14	96	47	10	3¼	2,240	37 20	63·0
6	Red Fife	" 14	96	44	10	3	2,160	36 ..	62·0
7	Red Fife (Ottawa Seed)	" 15	97	48	8	2¾	2,120	35 20	60·0
8	Marquis	" 14	96	43	10	3½	2,080	34 40	64·0
9	Bishop	" 12	94	44	5	3	2,080	34 40	61·5
10	Bobs	" 14	96	47	6	3¼	2,040	34 ..	62·0
11	Early Red Fife	" 15	97	46	6	3	2,000	33 20	60·0

FIELD CROPS OF WHEAT.

Five varieties of spring wheat were grown in half-acre lots.

The land was similar to, and received the same treatment as that which was devoted to the uniform test plots.

These field lots were sown on May 12.

The following yields were obtained;—

Huron, 34 bush., 40 lbs. per acre; White Fife, 28 bush., 14 lbs. per acre; Early Riga, 26 bush. per acre; Pringle's Champlain, 25 bush., 24 lbs. per acre; Red Fife, 22 bush., 32 lbs. per acre.

EXPERIMENTS WITH OATS.

Fifteen varieties of oats were sown in uniform test plots of one-fortieth acre each, the land being a heavy clay loam on which roots had been grown the previous year, and manure applied for that crop. This was ploughed in the fall of 1910, well worked up in the spring, sown May 11, at the rate of from two to two and one-half bushels per acre; 10 lbs. clover and 12 lbs. timothy were sown with this crop.

The following were the yields obtained:—

OATS—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after Cleaning.
				In.		In.	Lbs.	Bush. Lbs.	Lbs.
1	Swedish Select	Aug. 12	93	47	5	7½	2,800	82 12	35
2	Lincoln	" 12	93	48	5	8	2,780	81 26	35·5
3	Improved Ligowo	" 10	91	43	5	7½	2,760	81 6	37·5
4	Improved American	" 18	99	50	8	8	2,720	80 00	35
5	Abundance	" 10	91	46	5	7½	2,680	78 28	33·5
6	Twentieth Century;	" 12	93	45	5	7	2,640	77 22	35
7	Danish Island	" 9	90	43	6	7	2,520	74 4	34·5
8	Banner	" 10	91	44	8	7	2,500	73 18	34·5
9	Pioneer (black)	" 8	89	42	6	7½	2,480	72 32	38·5
10	Abundance (Garton's)	" 10	91	44	6	7	2,480	72 32	34
11	Irish Victor	" 10	91	42	8	7	2,440	71 26	36·5
12	Siberian	" 10	91	46	6	7	2,400	70 20	35
13	Thousand Dollar	" 10	91	45	7	8	2,240	65 30	36·5
14	Golden Beauty (yellow)	" 10	91	42	8	7	2,200	64 24	35
15	Gold Rain	" 10	91	46	6	7	2,000	58 28	37

EXPERIMENTS WITH BARLEY.

Seventeen varieties of barley, eight of six-row and nine of two-row, were sown, in uniform test plots of one fortieth acre each, the land being a heavy clay loam on which roots had been grown the previous year, and manure applied for that crop. This was ploughed in the fall of 1910, well worked up in the spring, sown May 11, at the rate of two bushels per acre; 10 lbs. clover and 12 lbs. timothy were also sown with this crop.

The following were the yields obtained:—

BARLEY (SIX-ROW)—Test of Varieties.

Number.	Name Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of straw on a scale of 10 points.	Average Length of head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after Cleaning.
				Ins.		Ins.	Lbs.	Bush. Lbs.	Lbs.
1	Albert	Aug. 8	89	38	10	2¼	2440	50 40	52
2	Nugent	" 5	86	44	6	2¾	2400	50 00	50
3	Oderbruch	" 5	86	36	4	2¼	2360	49 8	48½
4	O.A.C. No. 21	" 8	89	46	6	2½	2320	48 18	48½
5	Stella	" 10	91	40	7	2½	2240	46 32	51½
6	Manchurian	" 8	89	43	6	3	2040	42 42	46
7	Trooper	" 8	89	40	6	2½	1920	40 ..	50
8	Odessa	" 5	86	37	4	2	1880	39 8	46.2

BARLEY (TWO-ROW)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of straw on a scale of 10 points.	Average Length of head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after Cleaning.
				Ins.		Ins.	Lbs.	Bush.	Lbs.	Lbs.
1	French Chevalier	Aug. 10	91	40	7	3½	2840	59	8	53
2	Swedish Chevalier	" 10	91	38	6	4	2720	56	32	53
3	Beaver	" 8	89	42	10	3¼	2680	55	40	52
4	Clifford	" 10	91	45	5	3	2360	49	8	52
5	Invincible	" 10	91	44	10	2⅓	2280	47	24	53
6	Jarvis	" 10	91	42	8	2⅓	2080	43	16	53½
7	Standwell	" 10	91	42	8	2½	1960	40	40	50½
8	Hannchen	" 10	91	38	8	3	1880	39	8	50
9	Canadian Thorpe	" 10	91	40	10	3	1720	35	40	51

EXPERIMENTS WITH PEAS.

Twelve varieties of peas were sown in uniform test plots of one fortieth acre each.

The land was a clay loam in rather a poor state of fertility, no manure having been applied for quite a number of years. This was ploughed in the fall of 1910, well worked up and sown May 12, at the rate of from one-half to two bushels per acre, according to the size of pea.

The following yields were obtained:—

PEAS—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after Cleaning.
					Ins.	Ins.	Lbs.	Bush.	Lbs.	Lbs.
1	Golden Vine	Small	August 26	97	32	2	2,000	33	20	65 5
2	White Marrowfat	Large	" 28	99	36	3	1,860	31	..	65
3	Mackay	Medium	" 30	101	34	2¼	1,820	30	20	65·5
4	Picton	" ..	" 30	101	36	2¾	1,800	30	..	65 5
5	Chancellor	Small	" 26	97	30	1¾	1,680	28	..	65
6	Black-eye Marrowfat	Large	" 28	99	36	3	1,600	26	40	64 2
7	Daniel O'Rourke	Small	" 26	97	36	2	1,560	26	..	65·2
8	Arthur (Selected)	Medium	" 26	97	34	2	1,520	25	20	65 5
9	Prince	" ..	" 30	101	35	2½	1,480	24	40	65
10	English Grey	" ..	" 28	99	32	2	1,440	24	.	64
11	Paragon	" ..	" 28	99	36	2½	1,200	20	.	65
12	Prussian Blue	" ..	" 26	97	33	2	1,000	16	40	65

FIELD CROPS OF OATS, BARLEY AND MIXED GRAIN.

Crops.	Yield per Acre.		Weight per Bushel.
	Bush.	Lbs.	Lbs.
6 acres, Oats, upland	50	14	34
6 " Oats, marsh	37	22	34
2 " Barley	35	36	48
9 " Mixed Grain	54	20	40

EXPERIMENTS WITH INDIAN CORN.

Eight varieties of Indian Corn for ensilage were sown in uniform test plots of one hundredth acre each.

The land was a clay loam which had been in pasture for some years. This was ploughed in the fall of 1910, cultivated and ploughed again in the spring after manure at the rate of 20 loads per acre had been applied. To this was added complete fertilizer at the rate of 300 lbs. per acre, and the corn sown in rows, 36 inches apart, and also in hills, 36 inches each way.

This was gone over with a smoothing harrow before the plants came through the ground. The plants were thinned out to from four to six inches apart in the rows, and from four to six plants left in each hill. This was cultivated four times during the season with a one-horse cultivator.

A severe frost on September 15 very materially lessened the weight and value of this crop.

The corn was sown June 8, and cut October 4.

The following yields were obtained:—

INDIAN CORN FOR ENSILAGE—Test of Varieties.

Number.	Name of Variety.	Average Height.	Condition when Cut.	Weight per Acre Grown in Rows.		Weight per Acre. Grown in Hills.	
		Ins.		Tons.	Lbs.	Tons.	Lbs.
1	Superior Fodder	92	Tasseling	16	1,480	13	1,000
2	Wood's Northern Dent	73	Early milk	15	600	14	1,160
3	Angel of Midnight	79	Soft glazed	15	240	14	1,880
4	Eureka	83	Silking	14	440	15	600
5	Longfellow	86	Soft glazed	13	1,720	12	1,200
6	Early Mastodon	86	Silking	13	280	15	1,500
7	Selected Leaming	90	"	11	104	11	320
8	Compton's Early	78	Soft glazed	10	520	8	1,280

FIELD CROPS OF INDIAN CORN.

Three acres of Indian corn were sown in lots of one acre each, the varieties used being Longfellow, Compton's Early and Angel of Midnight. A heavy frost on September 14, very materially affected this crop. The total yield was 33 tons.

EXPERIMENTS WITH FIELD ROOTS.

All the uniform test plots of roots were grown on a clay loam that had grown clover the previous year, and had a light crop of aftermath clover turned under in the fall of 1910. This was well worked up in the spring and manure at the rate of 20 tons per acre spread on the surface and ploughed under, and again thoroughly cultivated. Complete fertilizer was then applied at the rate of 300 lbs. per acre.

Turnips.

Ten varieties of turnips were sown in uniform test plots of one hundredth acre each, in drills 24 inches apart, and the plants thinned out to one foot apart in the rows.

Sown May 27, and harvested October 13.

Turnips—Test of Varieties.

Number.	Name of Variety.	Description of Variety.	Yield per Acre, 1st Sowing.		Yield per Acre, 1st Sowing.	
			Tons.	Lbs.	Bush.	Lbs.
1	Hall's Westbury	Round, purple	40	1,600	1,360	..
2	Magnum Bonum	Flat, round, purple	40	00	1,333	20
3	Jumbo	Long, dark purple	39	1,360	1,322	40
4	Hartley's Bronze	Medium long, bronze	38	400	1,273	20
5	Mammoth Clyde	Medium round, purple	38	00	1,266	40
6	Good Luck	Round, purple	37	400	1,240	..
7	Halewood's Bronze Top	Medium long, bronze	35	1,200	1,186	40
8	Perfection Swede	Round, purple	35	880	1,181	20
9	Carter's Elephant	Long, dark purple	34	1,600	1,160	..
10	Bangholm Selected	Oblong, purple	29	240	970	40

Mangels.

Eight varieties of mangels were sown in uniform test plots of one hundredth acre each, in drills 24 inches apart and the plants thinned out to one foot apart in the rows.

Sown May 27, and harvested October 2.

Mangels—Test of Varieties.

Number.	Name of Variety.	Yield per Acre 1st Sowing.		Yield per Acre 1st Sowing.	
		Tons.	Lbs.	Bush.	Lbs.
1	Selected Yellow Globe	43	.....	1,433	20
2	Giant Yellow Intermediate	42	240	1,404	..
3	Yellow Intermediate	39	1,600	1,326	40
4	Half Sugar White	39	.....	1,300	..
5	Gate Post	38	....	1,266	40
6	Giant Yellow Globe	36	1,200	1,220	..
7	Perfection Mammoth Long Red	33	1,200	1,120	.
8	Prize Mammoth Long Red	33	160	1,102	40

SUGAR BEETS

Three varieties of sugar beets were grown in uniform test plots of one hundredth acre each, sown in drills 24 inches apart and the plants thinned out to one foot apart in the rows.

The seed was sown May 27, and the roots pulled October 12.

SUGAR BEETS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre, 1st Sowing.		Yield per Acre 1st Sowing.	
		Tons.	Lbs.	Bush.	Lbs.
1	Klein Wanzleben	21	800	713	20
2	French Very Rich	20	....	666	40
3	Vilmorin's Improved	13	.....	433	20

CARROTS.

Five varieties of carrots were sown in uniform test plots of one hundredth acre each.

Sown May 27, and pulled October 12.

CARROTS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre 1st Sowing.		Yield per Acre 1st Sowing.	
		Tons.	Lbs.	Bush.	Lbs.
1	Half Long Chantenay	21	400	706	40
2	Improved Short White	19	1,200	653	20
3	Mammoth White Intermediate	19	400	640	..
4	Ontario Champion	16	1,280	554	40
5	White Belgian	14	1,600	493	20

FIELD CROPS OF ROOTS.

Four varieties each of mangels and turnips were grown in half-acre plots. The land was similar to that on which was grown the uniform test plots and received like treatment, with the exception that on one-half of each plot no commercial fertilizer was used.

The following were the results obtained:—

Name of Variety.	Yield per Acre.		Yield per Acre.	
	Tons	Lbs.	Bush.	Lbs.
MANGELS.				
½ acre Yellow Globe, manure with fertilizer	27	750	912	30
" " " " only	26	1,000	883	20
" Mammoth Long Red, manure with fertilizer	27	600	910	.
" " " " only	26	240	870	40
" Yellow Intermediate, manure with fertilizer	26	500	875	..
" " " " only	22	1,000	750	..
" Golden Tankard, manure with fertilizer	20	800	680	..
" " " " only	16	960	549	20
TURNIPS.				
½ acre Magnum Bonum, manure with fertilizer	30	400	1,006	40
" " " " only	29	400	978	20
" Best of All (Scotch), manure with fertilizer	30	100	1,001	40
" " " " only	30	200	1,003	20
" Hartley's Bronze, manure with fertilizer	29	1,600	993	20
" " " " only	27	1,200	970	.
" Kangaroo, manure with fertilizer	26	1,900	898	20
" " " only	22	1,300	755	..

FIELD CROPS OF TURNIPS.

Eight varieties of turnips were grown in plots of one acre each. The land was a clay loam in only a fair state of fertility, and was given a dressing of barnyard manure at the rate of 25 tons per acre. To one-half of each acre commercial fertilizer at the rate of 300 lbs. per acre was added.

The following were the results obtained:—

Name of Variety.	Yield per Acre.		Yield per Acre.	
	Tons	Lbs.	Bush.	Lbs.
½ acre Magnum Bonum, manure with fertilizer	28	1,660	961	.
" " " only	27	1,320	922	.
" Hartley's Bronze, manure with fertilizer	27	620	910	20
" " " only	27	360	906	.
" Best of all (Scotch), manure with fertilizer	25	1,890	864	50
" " " only	25	1,260	854	30
" Jumbo, manure with fertilizer	25	1,820	863	40
" " " only	23	1,320	788	40
" Kangaroo, manure with fertilizer	25	550	842	30
" " " only	24	240	804	.
" Canadian Gem, manure with fertilizer	24	940	815	40
" " " " only	23	1,690	794	50
" Rennie's Prize Purple Top, manure with fertilizer	23	1,560	792	40
" " " " only	23	980	783	..
" Sutton's Champion, manure with fertilizer	23	60	767	40
" " " only	22	1,360	756	..

EXPERIMENTS WITH POTATOES.

Seventeen varieties of potatoes were sown in uniform test plots of one hundredth acre each, in rows 30 inches apart, one foot apart in the drill, the seed being cut to two strong eyes to the set.

The soil was a sandy loam on which clover hay had been grown the previous year. A light dressing of manure was applied to this land in the fall of 1910, and ploughed under. This was again ploughed in the spring, well harrowed, and complete fertilizer applied at the rate of 400 lbs. per acre.

The drills were harrowed down about the time the potatoes were coming up, to destroy weeds, and again rowed up.

The plants were sprayed four times throughout the season with Bordeaux mixture, Paris green being added on two occasions to destroy potato beetles.

There was no rot or disease of any kind. The sets were planted June 5 and dug September 27.

POTATOES—Test of Varieties.

No.	Name of Variety.	Total Yield per Acre.		Yield per Acre of Marketable.		Yield per Acre of Unmarketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Money Maker	470	48	382	48	88	..	Long, white.
2	Vick's Extra Early	462	..	352	..	110	..	" "
3	Ashleaf Kidney	446	36	402	36	44	..	Flat round "
4	Everett	431	12	343	12	88	..	" "
5	Carman No. 1	418	..	347	36	70	24	Round "
6	Rochester Rose	407	.	308	..	99	..	" red.
7	Dreer's Standard	400	24	341	..	59	24	" white.
8	Irish Cobbler	396	..	330	..	66	..	" "
9	Reeves' Rose	385	..	264	..	121	..	Long round, pink
10	American Wonder	367	24	268	24	99	..	" white
11	Morgan Seedling	364	12	281	36	82	36	Long round, pink and white.
12	Late Puritan	363	..	286	..	77	..	Lg. round, white
13	Empire State	356	24	308	..	48	24	" "
14	Gold Coin	332	12	279	24	52	48	Round "
15	Hard-to-Beat	323	24	264	..	59	24	" "
16	Dalmeny Beauty	300	..	249	24	50	36	" "
17	Factor	235	24	191	24	44	..	" "

ALFALFA.

Alfalfa was again sown this summer. The land was a clay loam, well underdrained. Lime at the rate of three casks per acre was spread on the surface and worked in, and the seed sown June 20. The alfalfa made healthy growth throughout the season.

Up to the present, no entirely satisfactory crop of alfalfa has been grown on this Farm, it being always partially killed out during the first winter, and, so far, we have never had a full stand the following season, although some small patches have survived each year, that sown in 1910 being no exception. This was cut twice during the summer of 1911, but was by no means a satisfactory crop.

SUMMARY OF CROPS GROWN, EXCLUSIVE OF UNIFORM TEST PLOTS OF GRAIN AND POTATOES.

	Bush.	Lbs.
Field grain	1,306	...
	Tons.	Lbs.
Field roots (turnips and mangels)	306	554
Fodder corn	33	...
Hay	103	...

APPLES.

The season of 1911 was quite favourable for apple growing, an average crop being gathered of unusually good quality.

In the orchard which was first set out at Nappan, from one to two trees only of each variety were planted as it was thought that this number was sufficient to determine whether a variety would succeed or not, but as it has since been proved which are the best for this section, it was decided, in 1910, to plant an orchard with fifteen trees each of the varieties shown to be most suitable, in order that these might be represented on a fairly commercial basis.

A piece of land about three acres in extent, fairly uniform, was selected for this purpose, the soil being a good clay loam, well drained.

The site is protected on the south and east by wood belts of native evergreens, and to afford protection on the west, from which many of the strong winds come, three rows of native spruce were set, in the spring of 1911, with the trees ten feet apart, the trees alternating in the different rows, to give greater protection.

The soil was thoroughly prepared in the autumn of 1910, and again in the spring of 1911, and on May 23 the trees were set out.

They were planted 20 x 28 feet apart and it is planned to cut out every other tree in the 20-foot rows, when they begin to crowd, so that instead of 20 x 28 feet apart, they will be 40 x 28 feet apart.

Notwithstanding the extremely warm summer, the trees grew remarkably well.

A close record was kept of the cost of planting and care of this orchard and the details of expenditures are given below. It is proposed to publish each year the cost of growing this orchard and eventually the revenue which is produced, the value of labour being calculated at the following rates: Manual labour, 17 cents per hour; teamsters, 20 cents per hour; horse labour, 7 cents per hour per horse.

The following is a list of the varieties:—

Duchess,
Wealthy.
Wolfe River.
Red Astrachan,
McIntosh Red,
American Golden Russet,
Bethel.
Talman.
Blue Pearmain,
Baxter or LaRue.
Pewaukee,
Arabka Winter,
Northern Spy,
Grimes' Golden,
Charlamoff.

COST OF COMMERCIAL ORCHARD, 1911.

Date.	Number of Hours Manual Labour.	Cost.	Number of Hours Horse Labour with Teamster.	Cost.	Work Engaged at.
		$ cts.		$ cts.	
May 20, 1911	To 195 trees at 6 cents....	31 20			
" 20, 1911	" 30 " 20 "	6 00			
" 15, 1911	" 2 men 2 days at $1.70...	6 80	....	.....	Measuring land.
" 17, 1911	" 4 " 1½ " 1.70...	10 20	....	.....	Digging holes.
" 23, 1911	" 4 " 1 day at 1.70...	6 80	....	.....	Planting trees.
" 24, 1911	" 4 " ½ " 1.70...	3 40	....	.....	" "
" 26, 1911	" 1 man 1 " 1.70...	1 70	....	.....	Pruning.
" 27, 1911	.....	.....	To 1 team 1 day at $3.40...	3 40	Cultivating.
June 4, 1911	....	.....	" 1 " 1 " 3.40...	3 40	Harrowing.
" 11, 1911	....	.....	" 1 " 1 " 3.40...	3 40	"
" 12, 1911	To 1 man 1 day at $1.70..	1 70	" 1 horse 1 " 2.70...	2 70	Spraying.
July 12, 1911	" 1 " 1 " 1.70...	1 70	" 1 " 1 " 2.70...	2 70	"
" 16, 1911	.. ..	... .	" 1 team 1 " 3.40...	3 40	Cultivating.
	....	.....	" 1 " 1 " 3.40...	3 40	"
	.....	.....	" 1 " 1 " 3.40..	3 40	Harrowing.
		69 50		25 80	

GARDEN VEGETABLES.

PEAS.

The seed was sown May 18 in plots 32 feet long by 3 feet wide. The following results were obtained:—

GARDEN PEAS—Test of Varieties.

Variety.	Remarks.				Dates of Picking and Yields.				Total.
	Fit for Use.	Quality.	Length of Pod.	Size of Pod.	July 30.	Aug. 5.	Aug. 9.	Aug. 18.	
			Inch.		Lbs.	Lbs.	Lbs.	Lb	Lbs.
Sutton's Excelsior..	July 18..	Very good	3 to 4	Medium..	14½	7	2	....	24½
Thomas Laxton....	" 16..	"	4 to 5	Large.....	10	5½	4	.....	17½
Stratagem	" 30..	Medium..	4	"	9	9	4	4	33½
American Wonder..	" 15..	" ..	2 to 3	Medium..	9½	7	5	.....	21
Telephone.	" 31..	Good.....	4	Large.....	14½	5	3	.....	22½
Premium Gem.....	" 15..	Medium. .	2 to 3	"	12	7	4	.....	23½
Gradus.....	" 25 .	" ..	2 to 2½	Small	6½	11	3	.....	20

BEANS.

The seed was sown May 18 in duplicate rows 32 feet long by 2¼ feet apart. One of these rows was allowed to ripen for seed, the other picked and a close record kept.

GARDEN BEANS—Test of Varieties.

Variety.	Remarks.				Dates of Picking and Yields.				Total.
	Fit for Use.	Quality.	Colour.	Length of Pod.	July 20.	July 26.	Aug. 2.	Aug. 8.	
				Ins.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs
Impd. Rust Proof.	July 17..	Good.....	Yellow. ..	5 to 6	4½	5½	9	3	22
Davis Wax.....	" 17.	Very good	" ...	7 to 8	8½	5	8½	.....	22
Fame of Vitry....	" 18..	Good . . .	Green.....	8	2½	5½	15	4	27
Dwarf Matchless..	" 16..	"	"	6 to 7	9	6	9	5	29
Early Refugee....	" 14.	"	"	5 to 6	14	12	3	.....	29
Valentine.....	" 14..	Very good	"	4½ to 5½	11½	11	4	.....	26½
Wardwells Kidney	" 16..	" .	Yellow. ..	5 to 6	3½	7	8½	6	24

TOMATOES.

The seed was sown in flats in the hot-beds April 8, in which they made a good growth. They were pricked out into strawberry boxes and remained in cold frames until June 12, when they were transplanted to the open. Eight plants of each variety were planted 5 feet apart each way. From these eight plants of each variety a record was kept.

TOMATOES—Test of Varieties.

—	Ripe Fruit and Dates of Picking.				Total.	Green Fruit and Date of Picking	Remarks.
	Sept. 9.	Sept. 17.	Sept. 22.	Sept. 30.		Sept. 30.	
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	
Trophy	8	22	30	.....	60	35....	Good.
Matchless	11	18	18	12	59	30....	"
Bonny Best.....	4¾	6	14	18	42¾	51....	"
Rennie's XXX..	5	5	11	21	....	20....	Blighted.
Florida Special .	.....	.....	.. ....	.....	.....	.....	Failure. No fruit.

CELERY.

Four varieties of Celery were grown in 1911.
Paris Golden Yellow, Rose Ribbed Paris, White Solid Pascal, Evan's Triumph.

The seed was sown in flats, and put in the hot-beds April 3 remaining there until May 26 when it was pricked out. They were planted in the open July 29, in rows 6 feet apart and the plants 1 foot apart in the rows. The plants were banked three times during the season.

The celery was dug October 23, and was found to be of a very good quality.

SMALL FRUITS.

In the spring of 1911, a small fruit plantation was set out, consisting of Black Currants, Red Currants, White Currants and Raspberries.

STRAWBERRIES.

The strawberry crop of 1911 gave promise of a very large yield, and did up until about the 15th of July, when a very dry spell set in, continuing for the remainder of their season. This caused them to dry up very rapidly, but still fairly good results were obtained. The size of the plot of each variety was 16½ ft. x 5 ft., or one five hundred and twenty-eighth of an acre.

The following are the yields of twenty of the most productive varieties last season.

STRAWBERRIES—Test of Varieties.

Variety.	Dates when Picked.					Yield per Plot.	Yield. per Acre.
	July 3.	July 7.	July 8.	July 11.	July 17.		
	Qts.	Qts.	Qts.	Qts.	Qts.	Qts.	Qts.
1. Pearl	8	.....	7	4	1	20	10,560
2. Warfield	7	.....	7	3	3	20	10,560
3. Michael's Early	10	.....	5	3	.....	18	9,504
4. Carrie	7	.....	6	3	1	17	8,976
5. Beverly	2	3	3	4	3	15	7,920
6. Lovett	8	2	2	3	.....	15	7,920
7. Capt. Jack	3	.....	5	4	1	13	6,864
8. John Little	7	.....	3	3	.....	13	6,464
9. Splendid	3	.....	5	4	1	13	6,464
10. Haverland	5	.....	5	2	1	13	6,464
11. Pocomoke	7	.....	3	2	.....	12	6,336
12. Ida	3	3	2	2	2	12	6,336
13. Swindle	3	.....	3	4	2	12	6,336
14. Early Beauty	5	.....	2	2	2	11	5,808
15. Princess	6	.....	2	2	1	11	5,808
16. Saunders	3	.....	3	3	2	11	5,808
17. H. W. Beecher	.....	.....	.....	6	4	10	5,280
18. Big Bobs	.....	.....	4	3	3	10	5,280
19. Afton	.....	.....	4	3	3	10	5,280
20. Gandy	4	.....	1	2	.....	7	3,696

HORSES.

Nine horses are at present kept on this Farm. Six of them are draft horses, and three for lighter purposes, one of the latter being now 19 years old and only fit for slow and light work. Throughout the year, two draft horses have been bought, while two old and unsound ones have been exchanged for one young one, leaving the number one more than at this time last year. All are in good condition.

DAIRY COW EXPERIMENT.

With a view to demonstrating the value of grading up the common cows of the country by the use of a pure-bred bull of one of the established dairy breeds, it was thought wise to commence an experiment along this line. The intention is to

make a two or three year record with dam (termed foundation heifer), giving credit for all product, and charging for all food consumed at a fixed rate, based on present current prices, and used throughout the experiment. The dam to be followed by daughter (termed first cross), with conditions made as nearly alike as possible, she in turn to be followed by daughter (termed second cross).

With this experiment in view heifers 1½ years old were purchased in the fall of 1910, bred to an Ayrshire bull, and the test commenced January 1, 1912.

Twelve heifers are being used for this purpose, a careful record being kept of the amount of food consumed and the product given.

EXPERIMENTS WITH STEERS.

Forty-five head of steers are under feeding experiment at present. They were bought in November, dehorned, and put in to feed November 30. All were fed alike during the month of December with roots (turnips) at the rate of 80 lbs. per day per steer, 10 lbs. hay and no meal. The hay crop having been unusually light in this section, with roots in abundance, it was decided to carry on this experiment, commencing January, as follows:—

Lot I.—Tied—Roots 40 lbs. and good hay.

Lot II.—Tied—Roots 80 lbs. and poor hay.

Lot III.—Loose—Roots 80 lbs. and poor hay.

Roots to be reduced one-half March 1. All to get meal alike, which was: January, 2 lbs.; February, 3½ lbs.; March, 5 lbs.; per head per day.

Up to date, March 31, all have made satisfactory gains.

Lot 1, average gain per day, 1·77 lbs.; Lot II, average gain per day, 1·88; Lot III, average gain per day, 1·97 lbs. This experiment will be carried on until April 30, a satisfactory sale having been made for delivery at that date.

COMPLETION OF STEER-FEEDING EXPERIMENT, 1911, FINISHED SINCE LAST REPORT.

On making my report of March 31, 1911, 62 steers were on hand and under feeding experiment.

The statement was then made that the price paid in November being so much in advance of previous years, left a serious doubt as to whether the results would give a profit or a loss. The latter has turned out to be so in this case.

Experiments carried on here have demonstrated that an increase in selling, over buying price, of from 1 to 1¼ cts. per lb. is required to cover a four to six months' feeding period.

The following is the continuation and conclusion of above experiment.

Total live weight of 62 steers, Dec. 1, 1910	70,745
Total live weight of 62 steers, April 10, 1911	82,470
Increase to April 10, 1911	11,725

FINANCIAL RESULTS.

Original weight of 62 steers, 70,745 lbs. at 5·40 cts. per lb.	$3,820 23
Weight at finish of 62 steers, 82,470 lbs. at 5·85 cts. per lb.	4,824 49
Increase in value	1,004 26
Cost of feed for lot 130 days	1,128 40
Net loss	124 14

Daily rate of gain per steer	1·45 lbs.
Cost of 1 lb. gain	9·62 cts.
Cost of feed per day per steer	14 "
Loss per steer	$2 00

SHEEP.

The flock of sheep now numbers 26 head, consisting of 8 Shropshires, 6 Leicesters and 12 grades.

POULTRY.

Four breeds of poultry are kept: White Leghorns, Barred Plymouth Rocks, Buff Orpingtons and Black Minorcas, numbering in all 24 head.

BEES.

Fourteen colonies were put into winter quarters December 5, 1910. No colonies were lost although four were found to be rather weak and were united, making a total of twelve colonies which were put on summer stands on the evening of April 4. Experience has shown us that putting them out at night is preferable to morning. When taken out at night they will not leave the hive until the weather is right for flight whereas, when moved in the morning, they are apt to fly at once no matter what the weather is like and loss from chilling ensues.

Clover being badly winter-killed in this section, all honey gathered was dark and of a poor quality.

Eighteen colonies were put in the cellar in November. The hives were prepared for the winter in the usual way, being raised 2 inches from the bottom board and a covering of three empty bags put over each, the wooden cover having been removed.

At date of writing, March 31, all are doing well.

EXHIBITIONS.

An exhibit of farm products was made at the Nova Scotia Provincial Exhibition, Halifax, N.S., and at the New Brunswick Provincial Exhibition, at Fredericton, N.B.

AGRICULTURAL MEETINGS ATTENDED.

During the year, I attended and delivered addresses at the following meetings:—

Amherst, N.S.
Parrsboro', N.S.
Diligent River, N.S.
Middle River, N.S.
Antigonish, N.S.
Murray River, P.E.I.
Kingston, P.E.I.
Cornwall, P.E.I.
N. Milton, P.E.I.
N.S. Agricultural College Short Course, Truro, N.S.
Live Stock Convention, Ottawa, Ont.
Georgetown, P.E.I.
Summerside, P.E.I.

CORRESPONDENCE.

During the year 2,482 letters were received and 2,215 sent out, exclusive of reports and circulars sent out with samples of potatoes.

DISTRIBUTION OF POTATOES.

The annual distribution of potatoes for seed purposes was 260 samples.

METEOROLOGICAL RECORDS.

Months.	Temperature F.—Monthly.					Rain-fall.	Snow-fall.	Total Precipitation.	Sunshine.
	Maximum.		Minimum.		Mean.				
1911.	Date.	°	Date.	°	°	Ins.	Ins.	Ins.	Hours.
April	30	73	3	12	36·63	·71	9	1·61	228½
May	22	85	17	26	52·96	·69	.....	·69	328
June	30	81	4	35	59·21	3·17	.....	3·17	254
July	6	89	3	45	68·48	2·30	.....	2·30	334
August	10	86	25	38	64·21	2·17	.....	2·17	298
September	3	75	15	27	53·71	4·74	.....	4·74	202
October	23	66	7	21	43·96	1·35	.....	1·35	202
November	13	60	26	13	34·33	2·84	10	3·84	112
December	11	54	31	4	17·52	1·17	4½	1·62	105
1912.									
January	9	45	27	−24	11·70	·55	14	1·95	148½
February	22	45	12	−18	13·22	·16	16	1·76	124
March	13	48	6	−15	27·54	1·26	11½	2·41	117

Sunshine not taken by recording instrument.
Ten inches of snow-fall is reckoned as equivalent to one inch of rain-fall.

I have the honour to be, sir,
Your obedient servant

R. ROBERTSON,
Superintendent.

EXPERIMENTAL STATION FOR CENTRAL QUEBEC.

REPORT OF G. A. LANGELIER, SUPERINTENDENT.

CAP ROUGE, QUE., March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit herewith the second report of the operations on the Experimental Station for Central Quebec.

CHARACTER OF SEASON.

The weather, which had kept rough and stormy to the end of March, got milder soon after the beginning of April, and what was thought at first would be a very late spring, turned out to be an average one for earliness.

The first thing to be sown was sweet peas, on May 4, and grain was put in on the 15th. The latter part of this month was very hot, the temperature rising to 91° F. on the 22nd. As there was very little rain, the hay crop and pastures received a set-back from which they did not recover. The old meadows suffered the most, and as the precipitation of 4·12 inches in June helped out considerably the seedings of 1910, because the thick clover had shaded the ground and conserved more moisture during the drought of May, the comparison was a good object lesson to many farmers who take from six to ten crops of hay in succession from the same field.

June was a splendid month for growth of all plants, with its warm weather and heavy precipitation. Potatoes were put in on the 7th, corn on the 8th and 9th, and swedes on the 22nd and 23rd.

July was very hot, and haying was comparatively easy, with light winds to help evaporate the outside moisture. It was commenced on the 7th and finished on the 15th.

The weather continued quite warm in August, and corn seemed to be the only thing which was not suffering. The potatoes had been badly hurt and not more than half a crop was harvested in this district. The oats matured too early—some of them were cut on the 12th—and the yield was much lessened, on account of the grain being light.

September was a pleasant month, though a rainy one. Corn was cut from the 23rd to the 28th, and was above the average, both at the Experimental Station and on nearly all the farms where it was grown in the eastern part of Quebec.

October started well, and advantage was taken of the fine weather to pull potatoes on the 3rd. The cool nights of the previous month, though they did not help the potatoes, caused the swedes to recover from the temporary set-back which they had received during the hot spell of July and August, and these were an average crop. They were pulled from the 16th to the 24th.

The latest work done on the farm was ploughing the old garden, on November 3. The next day, the ground froze solid.

December was, on the average, milder than it is usually and it rained from the 10th to the 13th inclusive. Fortunately, there fell enough snow on the 16th, 17th and 18th, to cover the ground well before hard frosts came, as otherwise the grass lands would have been badly hurt.

January was very cold and windy, which practically stopped all work usually done by farmers during this month.

February was rougher yet. It blew nearly every day, and the snow piled up in banks of from 10 to 12 feet high at different places around the buildings on the Experimental Station.

With March came better weather, though it was cold. Roads were good and everybody who had logs, fuel, or anything else yet to haul, has been hard at work to finish before the spring thaw.

FIELD WORK.

The crops grown in 1911 were as follows:—

Crop.	Variety.	Acreage.	Total Yield.	Yield per Acre.
			Lbs.	Lbs.
Corn	Longfellow	4·88	122,925	12 tons. 1,911
Swedes	Magnum Bonum	3·00	88,920	14 " 1.640
Potatoes	Irish Cobbler	0·19	1,515	131 bush. 18
"	Green Mountain	0·58	4,140	119 " 36
"	Unknown	0·23	1,195	86 " 18
Barley	Mensury	3·72	3,605	20 " 9
Oats	Banner	34·36	42,808	36 " 22
"	Garton's Abundance	4·88	3,692	22 " 9
"	Waverley	4·86	3,113	18 " 29
"	Gold Rain	0·70	430	18 " 2
Hay	Clover	7·00	28,000	2 tons } Approximate.
"	Timothy and Clover	27·00	81,000	1½ " }
"	Old Meadow	24·00	48,000	1 " }

CULTURAL EXPERIMENT WITH INDIAN CORN.

Four plots of nearly equal size were sown within forty-eight hours of one another at different distances, and the result follows:—

In drills	42	inches apart,	8	inches between plants,	13·89	tons per acre.
"	48	"	8	"	13·82	"
In hills	42	"	42	"	11·92	"
"	36	"	36	"	11·33	"

The corn in hills had a better colour, but no comparison of the digestible nutrients in each was made this year.

ROTATIONS

Four rotations were started in 1912, as follows:—

'D'—Three years—

First year: Corn, roots, potatoes, peas, and peas and oats to cut for soiling or for hay.

Second year: Oats, seeded down with 10 lbs. red clover, 6 lbs. timothy and 3 lbs. alsike per acre.

Third year: Hay, cut early and again cut late, if possible.

'C'—Four years—

First year: Corn, roots, potatoes, peas, and peas and oats to cut green for soiling or for hay.

Second year: Grain.

Third year: Hay.

Fourth year: Pasture.

'J'—Six years—

First year: Corn, roots, potatoes, peas, and peas and oats to cut green for soiling or for hay.

Second year: Grain.

Third year: Hay.

Fourth year: Pasture.

Fifth year: Grain.

Sixth year: Hay.

'I'—Six years—

First year: Corn, roots, potatoes, peas, and peas and oats to cut green for soiling or for hay.

Second year: Grain.

Third year: Hay.

Fourth year: Hay.

Fifth year: Pasture.

Sixth year: Pasture.

As some of the ground on which were these rotations was ploughed during the autumn of 1910, not all the plots which should have been in hay were so. These will be right in 1912, when it is also expected that a five-year and another six-year rotation will be started. All the plots are one acre in area, and as two alleys pass alongside them, they can be easily examined.

While a statement of cost of production and value of crop on each rotation would be of no value at present, being the result of only one year's work, it is hoped to publish such a record after more extended trial.

LIVE STOCK.

HORSES.

There are four teams of from 2,600 to 3,200 lbs. weight per team, and a driver of about 1,000 lbs. One team was bought this year.

EXPERIMENT—WINTERING A HORSE AT LOW COST.

An experiment was made with a twelve-year-old gelding who received from November 15 to March 31, a ration composed of one pound of swede turnips, one pound of oat straw and one pound of hay (mixed grasses from an old pasture) per day for each 100 lbs. of his weight. The horse worked until the end of October after which the oats were gradually replaced by swedes and straw, and the timothy by the hay above mentioned. By November 15 he was down to the new ration, and though the change was quicker than it perhaps should have been, the animal did not decrease in weight. Of course, he did no work. The box stall in which he stood was bedded with saw-dust, so that there would be no chance of the gelding eating his bedding, and everything left in the manger was weighed, but there was very little of this. The only exercise which the horse got was to drive the cream down to the railway station, a distance of 1½ miles for each trip, three times a week. Not to burden this

report with figures showing weekly weighings, it may be said that the horse, on March 31, at the close of the experiment, weighed 20 pounds more than he did at the commencement. From above date to May 1, the turnips and straw will gradually be replaced by oats, the mixed grasses hay by timothy, and light work will be given him, gradually increasing this and the ration, until on May 15 or thereabout, he should be able to take part in the spring's work without injury.

The temperature of the box stall next to where the horse stood was taken three times a day all winter, and it was remarkable how the weight of the animal decreased during weeks when there was a very cold spell.

According to tables made up in digestion experiments with horses (see Farmers' Bulletin No. 170, U.S. Dept. of Agriculture), ten pounds of the feeding stuffs in above ration, or enough for a 1,000-lb. horse, would contain 6·9 lbs. of digestible nutrients, 0·64 lb. of digestible protein, and the nutritive ratio would be 1·10. Grandeau and Leclerc, the well-known French investigators, were able to maintain the weight of three horses getting walking exercise for half an hour daily on a ration which supplied 7 lbs. of digestible nutrients, and an average of 0·54 lbs. of digestible protein, so that our ration was theoretically about correct. As far as the nutritive ratio is concerned, it does not seem to matter very much, as Grandeau fed the above mentioned three horses, sometimes on a ration of horse beans and straw having a nutritive ratio of 1·3, and again on one of Indian corn and straw having a ratio of 1·10. The effect of the rations was about the same in all cases, and any difference was in favour of the corn and straw ration having the wider ratio. As Henry says, it seems that the nutritive ratio for horses may vary widely without injury, as long as enough crude protein is given.

Cattle.—During the year, 1 bull, 10 cows and 4 heifers, registered French Canadians, and 11 cows appearing to be grades of the same breed were purchased. Up to the end of March, two of the grades, which had been served before we got them, calved, one a bull which was sold to the butcher, and the other a heifer which is true of colour and which is being raised.

One of the grade cows has given over 9,000 lbs. of milk from July to March inclusive, or an average of more than 1,000 lbs. per month. Both her dam and her daughter are in the Station herd.

It is planned to start with a rather low standard, say 5,000 lbs., and discard any cow, registered or not, who does not come up to it in 1912, not rejecting heifers after their first period of lactation, but keeping them two years. Any one giving less than 4,000 lbs. then, would have to be disposed of.

As the cows were bought at different times through the season, and some of them late in the fall their record is not given this year.

Swine.—There are now one boar, four breeding sows and two gilts, all registered Yorkshires, besides nine barrows and sows, fattening, and which will be ready for the butcher in early June when prices are generally high.

During the year, one sow in pig was sold, one 200 lb. boar, and 20 pigs from 3 to 4 months old. Twice as many of the young ones could have been sold if available.

Sheep.—There are no sheep yet on the place; it is hoped to do some work with sheep in the near future.

Poultry.—There are two pens of White Wyandottes, one of 11 yearling hens and another of 14 pullets. Both are headed by good, strong males and it is planned to raise from 75 to 100 chickens yearly, the poultry-house not being large enough to accommodate more stock.

TESTS OF VARIETIES.

CEREALS.

All the test plots were of one-sixtieth acre each. May was unusually hot, as high as 91° F. being registered on the 22nd. The precipitation was only 1½ inches during this month, so that the ground was quite dry when the grain was sown. During June there was a rainfall of 4·12 inches and the weather was warm, so that seeds germinated very fast. This was a consolation to some farmers who were late putting in their crop, as in August the late-sown grain had caught up to that put in early. This consolation, however, was only momentary, as when threshing came, the late-sown grain, which matured too quickly, was very light, and the yield low.

These test plots were on a piece of light sandy loam, underlaid with shale, which has received an application of 20 tons of manure per acre in 1910 and which were in potatoes and corn that year. It had been disced twice with the double 'cut-away' in the fall of 1910, and was disced twice more with the same machine and harrowed with the spike tooth once before being sown in 1911.

SPRING WHEAT—1½ Bushels per Acre Seed.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
					Lbs.	Bush. Lbs.	Lbs.
1	Huron	May 19	Aug. 14	87	2340	39·00	61.5
2	Prospect	"	" 14	87	2250	37.30	60.0
3	Bobs	"	" 14	87	2130	35.30	62.5
4	Preston	"	" 12	85	1845	30.45	60.5
5	Bishop	"	" 14	87	1830	30.30	62.5
6	Marquis	"	" 14	87	1725	28.45	63.2
7	Yellow Cross	"	" 14	87	1635	27.15	64.0
8	Red Fife	"	" 12	85	1290	21.30	62.0
9	White Fife		" 14	87	885	14.45	61.5
10	Early Red Fife	"	" 12	85	765	12.45	62.0

OATS—2½ to 3 Bushels per Acre Seed.

1	Daubeney	May 19	Aug. 3	76	2880	84.24	33.
2	Gold Rain	" 19	" 14	87	2850	83.28	37.2
3	Banner	" 19	" 14	87	2820	82.32	34.2
4	Swedish Ligowo	" 19	" 14	87	2805	82.17	35.0
5	Twentieth Century	" 19	" 14	87	2610	76.26	35.0
6	Clydesdale	" 19	" 14	87	2580	75.30	35.5
7	Siberian	" 19	" 14	87	2520	74.04	34.0
8	Victory	" 19	" 14	87	2460	72.12	36.5
9	Sixty Day	" 19	" 14	74	2430	71.16	32.0
10	Thousand Dollar	" 19	" 14	87	2130	62.22	35.0
11	Garton's Abundance	" 19	" 14	87	2115	62.07	34.5

SIX-ROW BARLEY—2 Bushels per Acre Seed.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
					Lbs.	Bush. Lbs.	Lbs.
1	Escourgeon	May 19	Aug. 5	78	1740	36.12	50
2	Odessa	" 19	" 4	77	1410	29.18	48
3	Success	" 19	July 26	68	1305	27.09	44
4	Manchurian	" 19	Aug. 6	79	1290	26.42	48
5	Stella	" 19	" 3	76	1170	24.18	48.5
6	Black Japan	" 19	" 7	80	990	20.30	49.0
7	O.A.C. No. 21	" 19	" 7	80	669	13.36	47.5

TWO-ROW BARLEY—2 Bushels per Acre Seed.

1	Swedish Chevalier	May 19	Aug. 12	85	1980	41.12	51.5
2	Early Chevalier	" 19	" 1	74	1920	40.00	50.0
3	Hannchen	" 19	" 12	85	1680	35.00	51.0
4	Beaver	" 19	" 14	87	1620	33.36	50.2
5	Swan's Neck	" 19	" 12	85	1590	33.06	50.5
6	Duckbill	" 19	" 9	82	1425	29.33	49.5

PEAS—2½ to 3 Bushels per Acre Seed.

1	Arthur Selected	May 18	Aug. 13	87	2280	38.00	65
2	English Grey	" 18	" 13	87	2010	33.30	64.5
3	Wisconsin Blue	" 18	" 13	87	1950	32.30	65.5
4	Golden Vine	" 18	" 13	87	1935	32.15	66.0
5	Mackay	" 18	" 8	82	1755	29.15	65.0
6	White Marrowfat	" 18	" 13	87	1740	29.00	65.2
7	Black-eye Marrowfat,	" 18	" 8	82	1665	27.45	65.0
8	Chancellor	" 18	" 8	82	1560	26.00	66.0
9	Prussian Blue	" 18	" 13	87	1245	20.45	68.0
10	Paragon	" 18	" 8	82	1020	17.00	65.5

MIXED GRAINS—2½ Bushels per Acre Seed.

1	Swan's Neck Barley & Gold Rain Oats	May 19	Aug. 12	85	2280		
2	Swedish Chevalier Barley & Thousand Dollar Oats.	" 19	" 14	87	1665		
3	Duckbill Barley & Banner Oats	" 19	" 14	87	1605		
4	Manchurian Barley & Daubeney Oats	" 19	Aug. 1	74	1185		

If we calculate the digestible protein found in the total of each of these crops, it is as follows, per acre: Peas, 338·05 lbs.; oats, 274·34 lbs.; mixed oats and barley, 161·66 lbs.; wheat, 146·96 lbs.; two-row barley, 142·96 lbs.; six-row barley, 102·73 lbs. Choosing the best variety of each, the difference is still greater, as follows: Arthur selected peas, 549·16 lbs.; Daubeney oats, 308·16 lbs.; Swan's Neck barley and Gold Rain oats, 218·28 lbs.; Huron wheat, 205·92 lbs.; Swedish Chevalier barley (two-row), 166·32 lbs.; Escourgeon barley (six-row), 146·16 lbs.

According to the above figures, the pea crop would be a very important one as a source of cheap protein. The popular impression is contrary to this, and it will be interesting to see the figures of 1912.

ROOTS.

All the test plots were of one-fiftieth of an acre. As these were sown at the end of May, they escaped the hot spell of that month, and started very well during June, which had abundance of rain. No doubt, the very warm weather of July and August affected them a little, but the cool nights of September brought relief and accelerated the growth.

These plots were on a wet, sour piece of ground, but it was the only piece available. The low yield of the mangels and sugar beets was due mainly to this. It is expected to have them all on good average land in 1912, when the results will be more satisfactory.

TURNIPS (Swedes)—Drills 30 inches apart, plants 8 inches apart.

Number.	Name of Variety.	Date of Sowing.	Date of Pulling.	Yield per Acre.		Yield per Acre.	
				Tons.	Lbs.	Bush.	Lbs.
1	Good Luck	May 30...	Oct. 13.....	26	1,122	885	22
2	Carter's Elephant	" 30....	" 13.....	25	115	835	15
3	Magnum Bonum	" 30....	" 13.....	24	1,344	822	24
4	Jumbo	" 30....	" 13.....	23	105	768	25
5	Halewood's Bronze Top	" 30....	" 13.....	22	1,874	764	34
6	Mammoth Clyde	" 30....	" 13.....	22	949	749	9
7	Hartley's Bronze	" 30....	" 13....	22	718	745	18
8	Bangholm Selected	" 30....	" 13.....	21	1,639	727	19
9	Perfection	" 30....	" 13.....	20	1,865	697	45
10	Hall's Westbury	" 30....	" 13.....	19	1,321	655	21

MANGELS—Drills 30 inches apart, plants 8 inches apart.

1	Giant Yellow Intermediate	May 30	Oct. 11.....	9	1,429	323	49
2	Gate Post	" 30	" 11.....	7	263	237	43
3	Half Sugar White	" 30	" 11.....	6	1,878	231	18
4	Perfection Mammoth Long Red	" 30	" 11.....	6	721	212	1
5	Prize Mammoth Long Red	" 30	" 11.....	4	1,021	150	21
6	Giant Yellow Globe	" 30	" 11.....	4	18	133	38
7	Yellow Intermediate	" 30	" 11.....	3	1,941	132	21
8	Selected Yellow Globe	" 30	" 11.....	3	553	109	13

CARROTS—Drills 30 inches apart, plants 4 inches apart.

1	Improved Short White	May 30....	Oct. 12.....	10	1,202	353	22
2	White Belgian	" 30....	" 12.....	9	1,429	323	49
3	Mammoth White Intermediate	" 30....	" 12.....	9	118	301	58
4	Half Long Chantenay	" 30....	" 12.....	7	1,497	258	17
5	Ontario Champion	" 30....	" 12.....	7	1,034	255	4

SUGAR BEETS—Drills 30 inches apart, plants 8 inches apart.

1	Klein Wanzleben	May 30...	Oct. 11.....	4	365	139	25
2	Vilmorin's Improved	" 30....	" 11.....	3	1,594	126	34
3	French Very Rich	" 30...	" 11.....	3	515	108	35

POTATOES.

The yield of each variety was calculated from one row 66 feet long. They were sown on June 3, and escaped the drought of May. The warm weather of July and August, though, hurt them all badly and decreased the crop.

The ground where they were planted was ploughed in August, 1910, and cultivated about half a dozen times the same autumn. Thirty tons of manure per acre was applied in thte spring of 1911, the land ploughed, disced, harrowed, rolled and harrowed, then the drills were made 30 inches apart, the sets being dropped about every 12 inches and covered with the double mouldboard plough. The seed was not treated against disease. They were ready for use from the 6th to the 26th of August.

Number.	Name of Variety.	Seed from	Yield.					
			Marketable.		Unmarketable.		Total.	
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.
1	Late Puritan	Charlottetown	203	13	13	12	216	25
2	Money Maker	Nappan	169	24	13	12	182	36
3	American Wonder	Charlottetown	158	24	8	48	167	12
4	Empire State	"	150	09	8	48	158	57
5	Ashleaf Kidney	"	151	48	6	36	158	24
6	Carman No. I	Nappan	143	..	6	36	149	36
7	Gold Coin	"	135	02	14	34	149	36
8	Irish Cobbler	"	136	..	8	48	144	48
9	Morgan Seedling	Charlottetown	123	28	15	24	138	52
10	Vick's Extra Early	"	114	24	17	36	132	..
11	Dreer's Standard	"	118	48	4	24	123	12
12	Rochester Rose	Nappan	108	21	14	18	122	39
13	Dalmeny Beauty	Charlottetown	68	12	8	48	77	..
14	Carman No. I	Ottawa	24	12	2	12	26	24
15	Hard to Beat	"	13	12	8	48	22	..
16	Irish Cobbler	"	13	12	6	36	19	48
17	Ashleaf Kidney	"	8	48	6	36	15	24
18	Empire State	"	2	18	13	06	15	24
19	Factor	"	8	06	6	36	14	42
20	Rochester Rose	"	..	..	11	..	11	..
21	Reeves' Rose	Indian Head	..	..	6	36	6	36
22	Gold Coin	Ottawa	..	..	5	30	5	30
23	Morgan Seedling	"	..	..	5	30	5	30
24	Reeves Rose	"	..	..	5	30	5	30
25	Money Maker	"	..	..	5	..	5	..
26	Dalmeny Beauty	"	2	24	2	24	4	48
27	Late Puritan	"	..	..	4	..	4	..

HORTICULTURE.

TREE FRUITS.

The following were planted during the latter part of May, 1911:—

Apples—Commercial orchard.—192 trees of the following varieties: Alexander, Duchess, Fameuse, Langford Beauty, Lowland Raspberry, Milwaukee, Montreal Peach, McIntosh Red, McMahan, Red Astrachan, St. Lawrence, Wealthy, Wolf River, Yellow Transparent.

Apples.—Variety tests—111 trees of the following varieties: Adonis, Beauty, Blue Pearmain, Brackett, Bruno, Burt, Calville Bode, Claire, Clive, Charlamoff, Cora, Cromer Crusoe, Dyer (Pomme Royale), Edgehill, Estaline, Forest, Garner, Gem City,

Granby, Hoadly, Hyslop (crab), Dudley, Kelso, Kinkhead, La Victoire, Medford, Mendel, Noel, Okabena, Patten's Duchess, Pensaukee Russet, Percival, Perfect, Petrel, Radnor, Reinette de Damson, Reinette, Dippedelle, Renaud, Rochelle, Royal Table, Rupert, Scarlet Pippin, Severn, Shiawassee, Sonora, Stone, St. Lawrence, Thurso, Transcendent, Walton, Walter, Whitney (crab).

Plums.—Variety tests—89 trees: Damas, Reine Claude Montmorency, Admiral Schley, Aitkin, Bixby, Bonne Sainte Anne, Brackett, Coe's Golden Drop, Consul, Cottrell, Cheney, Don, Fitzroy, Gloria, Grand Duke, Gueü, Hawkeye, Imperial Gage, Lombard, Lester, Mankato, Moore's Arctic, Niagara, Odegard, Omaha, Oren, Oyama, Pond's Seedling, Quackenboss, Raynes, Reine Claude, Shipper's Pride, Shropshire Damson, Snider Damson, Sunrise, Swift, Terry, Washington, Wolfe, Yellow Egg, Yellow European.

Cherries.—Variety tests—36 trees: Large Montmorency, Cherry France, Brusseler Braun, Cerise d'Ostheim, Fouche Morello, Griotte d'Ostheim, Griotte Morello, Hersformige Weichsel, Koslov, Minnesota, Ostheim, Montmorency Ordinaire, Morello, Orel, Susse Fruche Weichsel, Vladimir.

Pears.—Variety tests—13 trees: Winter Nelis, Duchesse d'Angoulême, Seckel, Clapp's Favourite, Flemish Beauty.

Dwarf Cherries (Prunus Tomentosa).—200.

SMALL FRUITS.

The following were set out at the same time as the above mentioned fruit trees:—

Black Currants.—Six bushes each of Champion, Eagle, Ontario, Boskoop Giant, Kerry, Victoria, Buddenborg, Success, Collins' Prolific, Lee's Prolific, Saunders, Topsy, Clipper, Eclipse, Climax.

Red Currants.—Six bushes each of Cherry, Cumberland, Fay's Prolific, Franco-German, Greenfield, Perfection, Pomona, Rankins' Red, Red Dutch, Red Grape, Victoria Red, Wilder.

White Currants.—Six bushes each of Large White, White Cherry, White Grape.

Gooseberries.—Six bushes each of Downing, Gibb, Industry, Josselyn, Mabel, Queen Anne, Red Jacket, Rideau, Saunders, Silvia.

Raspberries.—Twelve canes each of Columbian, Cuthbert, Heebner, Sarah, and 24 each of Eaton, Herbert, King, Loudon, Marlboro.

Strawberries.—134 plants of the following varieties: Bisel, Greenville, Nettie, New Globe, Uncle Jim.

Most of the above were planted when the thermometer registered nearly 90° F., and during one of the driest spells ever experienced here, but a rather small proportion of the trees, bushes, canes and plants died.

CULTURAL EXPERIMENTS IN ORCHARD.

The ground used for the orchard was infested with couch grass, and it was decided to use, for a cover crop, rape on one-third of the area, buckwheat on one-third, and rape with buckwheat on the rest. This piece had been ploughed in August, 1910, and cultivated five or six times before the end of October. In May, 1911, twenty tons of manure per acre was applied, the land ploughed, disced, harrowed, and the trees planted. Afterwards, it was cultivated four times, harrowed, and sown to the cover crops about the beginning of

July. The growth was very good. From this experiment, it seems that for couch-infested ground, rape is the best. The trouble with buckwheat is that it ripens, shells, and the plant dries out, leaving lots of space for light to go through. In a fine, warm, open fall, the couch has thus a good chance to start anew. With rape, the ground is kept shaded and the couch choked down until killing frosts come.

VEGETABLES.

One hundred and ninety-two varieties were tested during 1911. Some were started in flats in the greenhouse, pricked out in other flats in the same place, then transplanted into hot-beds and finally set out in the garden.

The ground used for vegetables had been ploughed in August, 1910, and cultivated five or six times the same autumn. Thirty tons of manure per acre was applied in May, 1911, the land ploughed, disced, harrowed, rolled and harrowed again before the vegetables were put in. Frequent cultivations during the summer kept the weeds down and conserved moisture.

In the following tables will be found the results obtained from tests of some of the more important vegetables.

The figures under the headings 'Earliness' and 'Yield' respectively, represent the relative standing of each variety reported on, in the above particulars. Thus, under 'Earliness,' varieties marked 1 are the earliest, those marked 2 are the next earliest, and so on. Under 'Yield,' varieties marked 1 are the heaviest yielders, those marked 2 are the next heaviest, etc.

BEANS.

Name.	Sown.	Transplanted.	Ready for Use.	Relative Earliness & Yield.	
				Earliness.	Yield.
Challenge Black Wax	June 3		July 20	1	7
Davis Wax	" 3		" 25	4	11
Early Giant Bush Lima	" 3		Aug. 10	7	12
Early Refugee	" 3		July 27	5	5
Flageolet, or Giant Wax	" 3		" 27	5	4
Hodson Wax	" 3		Aug. 10	7	1
Old Homestead	" 3		" 7	6	2
Red Valentine	" 3		July 25	4	9
Refugee, or 1000 to 1—(Henderson)	" 3		Aug. 10	7	10
Refugee, or 1000 to 1—(Ont. Seed Co.)	" 3		" 10	7	3
Stringless Green Pod	" 3		July 22	2	8
Valentine	" 3		" 25	4	6
Wardell's Kidney Wax (Ont. Seed Co.)	" 3		" 22	2	8
Wardell's Kidney Wax (Thorburn)	" 3		" 24	3	5

CABBAGE.

Copenhagen Market	April 5	May 31	Sept. 8	5	16
Danish Ballhead	" 5	" 31	" 16	6	7
Danish Summer Ballhead	" 5	" 31	Aug. 23	2	2
Early Copenhagen Market	" 5	" 31	Sept. 8	5	8
Early Jersey Wakefield	" 5	" 31	Aug. 12	1	9
Early Red Delicatesse	" 5	" 31	Sept. 16	6	12
Extra Amager Danish Ballhead	" 5	" 31	" 16	6	4
Extra Dark Red Dutch	" 5	" 31	" 8	5	11
Extra Early Midsummer Savoy	" 5	" 31	" 8	5	14
Flat Swedish	" 5	" 31	Aug. 30	4	1
Improved Amager Danish Roundhead	" 5	" 31	" 30	4	6

CABBAGE—*Continued.*

Name.	Sown.	Transplanted.	Ready for Use.	Relative Earliness & Yield.	
				Earliness.	Yield.
Large Late Flat Drumhead	April 5	May 31	Sept. 8	5	3
Lubeck	" 5	" 31	" 8	5	18
Magdeburg	" 5	" 31	" 16	6	10
Red Danish Delicatesse	" 5	" 31	" 22	7	15
Red Danish Stonehead	" 5	" 31	" 16	6	13
Small Erfurt	" 5	" 31	Aug. 26	3	17
Winningstadt	" 5	" 31	" 26	3	5

CORN.

Black Mexican	June 3		Sept. 8	5	1
Country Gentleman	" 3		" 27	6	10
Dewitt's Early	" 3		Aug. 15	1	9
Early Evergreen	" 3		" 30	4	8
Early Malakoff	" 3		" 15	1	2
Fordhook Early	" 3		" 15	1	4
Golden Bantam	" 3		" 29	3	5
Golden Rod	" 3		" 29	3	1
Metropolitan	" 3		" 26	2	5
Pocahontas	" 3		" 26	2	3
Stowell's Evergreen (Graham)	" 3		Sept. 8	5	7
" " (Ont. Seed Co.)	" 3		" 8	5	6

LETTUCE.

All Heart	May 26		July 1	4
Big Boston	" 26		" 8	6
Black Seeded Simpson	" 26		June 27	1
Cos Trianon	" 26		July 1	4
Crisp as Ice	" 26		June 30	3
Giant Crystal Head	" 26		" 28	2
Grand Rapids (Ont. Seed Co.)	" 26		July 1	4
Grand Rapids (Thorburn)	" 26		June 28	2
Hanson	" 26		July 5	5
Iceberg	" 26		" 1	4
Improved Hanson	" 26		June 27	1
May King	" 26		July 1	4
Mignonette	" 26		" 8	6
Nonpareil	" 26		June 28	2
Red Edged Victoria	" 26		July 1	4
Wheeler's Tom Thumb	" 26		" 1	4

MUSKMELON.

Earliest Ripe	April 6	June 7	Sept. 18	5	11
Early Hackensack	" 6	" 7	" 12	3	1
Emerald Gem	" 6	" 7	" 20	6	12
Extra Early Green Citron	" 6	" 7	" 5	1	4
Hackensack	" 6	" 7	" 23	7	8
Hoodoo (Johnson)	" 6	" 7	" 18	5	9
Hoodoo (Steele-Briggs)	" 6	" 7	" 13	4	7
Melting Sugar	" 6	" 7	" 20	6	3
Montreal Green Nutmeg	" 6	" 7	" 12	3	6
Montreal Market	" 6	" 7	" 23	7	5
Paul Rose	" 6	" 7	" 20	6	10
Rocky Ford	" 6	" 7	" 10	2	2

ONIONS.

Name.	Sown.	Transplanted.	Ready for Use.	Relative Earliness and Yield.	
				Earliness.	Yield
Johnson's Dark Red Beauty	May 27		Aug. 7	3	6
Large Red Wethersfield (Ont. Seed Co.)	" 27		" 2	1	2
Large Red Wethersfield (Vilmorin)	" 27		" 2	1	4
Prizetaker	" 27		" 7	3	4
Salzer's Wethersfield	" 27		" 2	1	6
Small Silverskin	" 27		" 7	3	6
Southport Red Globe	" 27		" 5	2	5
Yellow Globe Danvers (Ont. Seed Co.)	" 27		" 7	3	3
Yellow Globe Danvers (Vilmorin)	" 27		" 7	3	1

PEAS.

American Wonder	June 2		July 17	3	6
Gradus	" 2		" 17	3	8
Gregory's Surprise	" 2		" 15	1	7
Heroine	" 2		" 29	8	4
Juno	" 2		Aug. 2	9	3
McLean's Advancer	" 2		July 27	6	1
Premium Gem	" 2		" 16	2	7
Stratagem	" 2		Aug. 2	9	2
Sutton's Excelsior	" 2		July 20	5	9
Telephone	" 2		" 28	7	5
Thos. Laxton	" 2		" 19	4	7

PEPPERS.

Chinese Giant	April 3	June 6	Remained green	3	3
Long Red Cayenne	" 3	" 6	Sept. 22	1	2
New Neapolitan	" 3	" 6	" 28	2	1
Red Chili	" 3	" 6	" 28	2	2

SQUASH.

Custard Marrow White Bush Scallop	June 5		Aug. 22	1	4
Delicata	" 5		Sept. 14	3	7
Heart O'Gold	" 5		" 8	2	1
Hubbard	" 5		" 14	3	6
Long Vegetable Marrow	" 5		Aug. 22	1	2
Long White Bush Marrow	" 5		" 22	1	5
Mammoth Whale	" 5		Sept. 14	3	3
Summer Crookneck	" 5		Aug. 22	1	8
White Congo	" 5		Did not ripen	4	9

TOMATOES.

Bonny Best	April 4	June 6	Aug. 19	7	10
Chalk's Early Jewel (Burpee)	" 4	" 6	" 19	7	14
Chalk's Early Jewel (Ont. Seed Co.)	" 4	" 6	" 15	6	9
Earliana	" 4	" 6	" 9	2	3
Earliest of All	" 4	" 6	" 10	3	4
First of All	" 4	" 6	" 10	3	1
Florida Special	" 4	" 6	" 25	8	13
Greater Baltimore	" 4	" 6	" 30	9	11
Livingston's Globe	" 4	" 6	" 30	9	17
Matchless	" 4	" 6	Sept. 12	11	16

TOMATOES—*Continued.*

Name.	Sown.	Transplanted.	Ready for Use.	Relative Earliness and Yield.	
				Earliness.	Yield.
Northern Adirondack Earliana	May 4	June 6	Aug. 7	1	6
Plentiful	" 4	" 6	Sept. 5	10	12
Ponderosa	" 4	" 6	" 12	11	15
Rennie's XXX Earliest	" 4	" 6	Aug. 14	5	2
Sparks Earliana (Burpee)	" 4	" 6	" 12	4	5
Sparks Earliana (C.E.F.)	" 4	" 6	" 9	2	7
Trophy	" 4	" 6	Did not ripen	12	18
Yellow Plum	" 4	" 6	Aug. 9	2	8

WATERMELON.

Cole's Early	April 6	June 5	Sept. 13	2	3
Florida Favorite	" 6	" 5	" 22	4	2
Improved Ice Cream	" 6	" 5	" 22	4	4
Phinney's Early	" 6	" 5	" 20	3	5
Salzer's Earliest	" 6	" 5	" 11	1	1

Beets sown May 30 were ready for use on July 25; Brussels Sprouts sown April 6 and transplanted May 31, were ready for use October 21; carrots sown May 30 were ready for use July 29; cauliflower sown April 6, and transplanted May 31, were fit for the table August 19; celery sown April 1, and transplanted June 8, was ready for use September 9; parsley, sown May 26, was ready for use July 22; parsnips, sown May 30, were ready on August 25; radish, sown May 26, were fit for table on June 24; and early turnips, sown May 27, were ready for use on July 15.

FLOWERS.

One hundred and fourteen varieties were sown, both in flats and pots in the greenhouse, to be later transplanted in the gard n, and directly outside when all danger from frost was passed.

The flowers were put in an old garden which was well dug and manured, and made a splendid show from the middle of August to October.

A few shrubs and vines, also a short piece of hedge were put in around the Superintendent's house, where it is high and dry, but with the warm weather of July and August, did practically nothing.

Over 3,000 bulbs were planted last fall in the same locality.

STATION IMPROVEMENTS.

Over 10,000 feet of tiles were put in during 1911.

An old bridge was torn down, a 24-inch metal pipe put in, and the whole filled up level with the road. Rock from an adjoining clump was used for this.

The foreman's house received two, and at some places, three coats of paint. A water closet was put in and pipes from there and the kitchen were led into a septic tank which was placed some 150 feet from the house.

A new ornamental wire fence was stretched in front of this house and the grounds were levelled and sown to Kentucky Blue grass. A neat shed was also built behind it.

An unsightly mound of shale which stood between two rotation plots was blasted and hauled down near the ornamental grounds, to be used for alleys in 1912. The spot will be covered with soil and manure, so that the rotations will be even all through.

About twenty acres of second-growth woods were chopped, and the wood hauled down near the buildings to be cut for fuel early in April. All this farm, the old Garneau place, next to the Transcontinental railway, is thus ready to be stumped, and put under crops. This is much better land than that now in cultivation.

VISITORS.

There were quite a number of persons visiting the farm during the year, some of the farmer's clubs sending out delegations, one of which, from Pointe-aux-Trembles, County of Portneuf, was composed of about 30 members. The rotation and trial plots, also vegetable tests, were the chief attractions.

MEETINGS.

I addressed three meetings, one at L'Ange Gardien, County of Montmorency, and the others at St. Raymond and St. Léonard, County of Portneuf. The main subject was Indian corn culture. Over 100 farmers grew corn as the result of this. It seems very hard, however, to make the majority of them understand that corn should not be sown thickly and though I made two visits at most of the places of the farmers who grew corn, only a few heeded the advice of giving room to the plant for the growth of ears.

CORRESPONDENCE.

During the year, 1,604 letters were received and 1,974 were sent, not including circulars.

DISTRIBUTION OF SEEDS.

Up to March 31, 1912, 55 small packages of sweet corn were sent out, and there are over 900 ready to go.

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Pure-bred French Canadian Mares at the Cap Rouge Station.



Some pure-bred French Canadian Cattle at the Cap Rouge Station.

METEOROLOGICAL DATA.

Month.	Temperature. F.					Rainfall.		Snowfall.			Sunshine.
	Highest.	Date.	Lowest.	Date.	Mean.	Inches.	No. days.	Inches.	No. days.	Total.	Total.
1911.											
April											
May	91·0	22	30·2	13	59·82	1·50	6			1·50	
June	83·0	29	39·2	3	61·14	4·12	13			4·12	
July	93·0	4	46·2	3	57·05	3·46	15			3·46	
August	88·0	4	42·2	30	65·86	2·76	11			2·76	
September	72·0	6	30·2	29	52·50	4·67	13			4·67	37·4
October	65·0	11	23·2	28	43·23	2·76	10			2·76	120·8
November	52·0	13	7·2	26	26·70	2·17	7	26·2	12	4·79	56·9
December	45·0	12	11·2	31	21·30	1·43	5	25·7	11	4·00	43·7
1912.											
January	34·0	20	24·2	27	1·94	·28	1	34·7	15	3·75	79·0
February	35·0	21	19·2	10	9·00			21·5	16	2·15	63·3
March	43·0	19	14·2	6	15·28	·23	2	21·7	10	2·40	165·3

The thermometers were only put up on May 8 and the sunshine recorder on September 21.

I have the honour to be, sir,
Your obedient servant,
GUS. LANGELIER.

EXPERIMENTAL FARM FOR MANITOBA

REPORT OF W. C. McKILLICAN, B.S.A., *Superintendent.*

BRANDON, MAN., March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to present herewith the twenty-fourth annual report of the Experimental Farm for Manitoba, at Brandon.

CROPS ON THE EXPERIMENTAL FARM.

Seeding began the last week of April; all crops were sown rather later than the average date. The dry weather in the early part of the summer reduced grain yields considerably, but induced early ripening. Wheat on summer-fallow and corn land was a good crop, and on stubble land fairly good. Oats were below average yield. Barley yielded well, due to the fact that it was sown chiefly on corn land.

Harvest and threshing were severely interfered with by continuous wet weather, and the quality of all kinds of grain lowered thereby.

Grass and clover crops were a fair yield, and alfalfa excellent.

The late rains greatly benefited the corn and root crops. Excellent yields were obtained, and roots and silage of excellent quality were stored for winter feeding.

Plums, currants and strawberries yielded profusely. There were very few apples this year and only a moderate crop of raspberries.

VARIETY TESTS.

The usual tests of varieties of cereal crops, corn and field roots, were conducted this year. The results of these tests have been reported in Bulletin No. 71. I shall not therefore report them here, but shall give the average results of these tests for five years.

SPRING WHEAT.

Eight varieties were sown in uniform test plots. The average results for five years are as follows:—

SPRING WHEAT—Five Year Average.

Variety.	Character of Head.	Average No. of Days Maturing.	Average Strength of Straw.	Average Immunity from Rust.	Average Weight per Bushel.	Average Yield per Acre.
					Lbs.	Bush. Lbs.
Marquis (average of 4 years)	Bald	106	Stiff	Very good	63·06	45 27
White Fife	"	115	"	Good	61·18	43 8
Bishop	"	107	Fairly stiff	"	60·1	42 2
Red Fife	"	114	Stiff	"	61·25	41 55
Preston	Bearded	109	"	Fairly good	61·26	41 52
Stanley	Bald	110	"	"	59·4	39 32
Huron	Bearded	109	"	"	60·7	37 46
Early Red Fife (average of 2 years)	Bald	109	"	Bad	59·25	37 50

Marquis has now established itself as the best of the early wheats that have been brought out by the Experimental Farms. Not only are the results of plot and field trials very satisfactory, but the milling and baking tests, as reported by the Dominion Cerealist, show it to be the equal of Red Fife for bread-making. It has therefore superseded Preston, Stanley, Huron and other early wheats formerly recommended for northern districts.

The selection of Red Fife, known as Early Red Fife, while a few days earlier than Red Fife, has shown itself to be very subject to rust and will now be abandoned.

In addition to these older varieties, eight new varieties recently produced by the Dominion Cerealist were tested for the first time. These varieties are as yet unnamed. When further tests bring out which are the more suitable for propagation, the Cerealist will name them, and the public will be given the results of tests.

OATS.

Eighteen varieties of oats were tested on uniform test plots. The averages for five years are as follows:—

OATS—Five Year Averages.

Variety.	Colour of Grain.	Average No. of days Maturing.	Average Strength of Straw.	Average Weight per Bushel.	Average Yield per Acre.	
				Lbs.	Bush.	Lbs.
Improved American	White	99	Stiff	38	107	16
Banner	"	99	"	37·92	106	18
Danish Island	"	99	Fairly stiff	37·9	106	03
Irish Victor	"	98	Stiff	36·95	100	01
Siberian	"	99	"	37·4	99	11
Twentieth Century	"	98	"	39·14	98	19
Golden Beauty	Yellow	102	Medium	37·7	97	22
Abundance	White	100	"	37·6	97	17
Swedish Select	"	98	Fairly stiff	39·7	96	15
Thousand Dollar	"	98	"	39·7	95	25
Improved Ligowo	"	97	"	39·6	91	27
Pioneer	"	102	"	38·6	87	32
Daubeney	"	89	Stiff	35·7	74	33
Regenerated Abundance (average 3 years)	"	95	Fairly stiff	40	93	25
Alsasman (average of 3 years)	"	95	Stiff	40·16	89	11
Gold Rain (average of 2 years)	Yellow	97	"	41·25	87	17
Victory (average of 2 years)	White	97	"	41·5	83	33
Orloff (average of 3 years)	Yellow & White	87	"	34·5	78	33

SIX-ROW BARLEY.

Eleven varieties of six-row barley were grown in uniform test plots. The average results for the last five years are as follows:—

Variety.	Average No. of Days Maturing.	Average Strength of Straw.	Average Weight per Bushel.	Average Yield per Acre.	
			Lbs.	Bush.	Lbs.
Mensury	85	Fairly stiff	48·9	63	02
Odessa	85	Medium	48·95	62	14
Yale	85	Fairly stiff	48·7	61	28
Mansfield	85	"	47·75	59	10
Claude	85	"	47·7	57	18
Albert	84	"	50·5	56	04
Trooper	86	"	49·36	53	38
Nugent	85	"	49·05	52	36
Stella	86	"	48·75	50	38
O.A.C. No. 21, (average of 4 years)	84	Stiff	47·3	63	39
Manchurian (1 year only)	85	Fairly stiff	46	76	22

Manchurian and O. A. C. No. 21 are two new sorts that appear very promising. Manchurian is a selected strain of Mensury, grown from a selection by Dr. C. E. Saunders, Dominion Cerealist. O. A. C. No. 21 is a selection made by Professor C. A. Zavitz, of the Ontario Agricultural College. Both appear more uniform and more true to type than the parent stock. The Manchurian appears to be the heavier yielder of the two, and O. A. C. No. 21 a little earlier and a little stiffer in the straw.

TWO-ROW BARLEY.

Seven varieties of two-rowed barley were grown in uniform test plots. The average results for the five years are as follows:—

Variety.	Average No. of Days Maturing.	Average Strength of Straw.	Average Weight per Bushel.	Average Yield per Acre.	
			Lbs.	Bush.	Lbs.
Canadian Thorpe	90	Fairly stiff	50·45	61	08
Swedish Chevalier	92	Weak	50·1	60	46
Standwell	91	Rather weak	49·2	60	44
Jarvis	89	Fairly stiff	49·59	54	08
Clifford	87	Stiff	48·6	48	42
Beaver	89	Fairly stiff	50	46	34
Hannchen (average of 2 years)	89	Medium	50·5	64	07

FIELD PEAS.

Twelve varieties of field peas were grown in uniform test plots. The averages for five years are as follows:—

Variety.	Size of Pea.	Average No. of Days Maturing.	Average Yield per Acre.	
		Lbs.	Bush.	Lbs.
Mackay	Medium	119	48	43
Prince	"	120	47	27
Paragon	"	120	45	55
Gregory	Large	119	45	11
English Grey	Medium	122	43	43
Picton	Small	120	41	13
Arthur	Medium	118	40	55
Chancellor	Small	116	40	43
Golden Vine	"	123	40	43
Prussian Blue	Medium	118	38	11
Black-eye Marrowfat	Large	126	35	41
Solo (1 year only)	Medium	113	51	10
Selected Arthur (1 year only)	"	111	34	..

INDIAN CORN.

Nine varieties of field corn were grown in rows 66 feet long and 42 inches apart. The average yield of fodder per acre for five years, is as follows:—

Variety.	Average Stage of Development when Cut.	Average Yield per Acre.	
		Tons.	Lbs.
Longfellow	Silk	19	1,956
Compton's Early	Silk—Early Milk	19	134
Superior Fodder	Tassel	17	1,006
Selected Leaming	Silk	16	1,541
Angel of Midnight	"	15	1,673
Eureka	Tassel—Silk	15	1,004
Champion White Pearl	" "	13	1,562
Northwestern Dent (average of 4 years)	Late Milk—Early Dough	14	462
Quebec Yellow (average of 2 years)	Firm Dough	14	413

Superior Fodder, Eureka and Champion White Pearl are too late for Manitoba climatic conditions. Northwestern Dent, though not as heavy yielding as some, is most satisfactory on account of its earliness.

TURNIPS.

Ten varieties of turnips were grown in uniform test rows. The average yields for five years, are as follows:—

Variety.	Average Yield per Acre.	
	Tons.	Lbs.
Halewood's Bronze Top	27	630
Hall's Westbury	26	1,346
Perfection Swede	25	2,596
Mammoth Clyde	25	230
Magnum Bonum	24	118
Good Luck	22	1,901
Carter's Elephant	22	1,742
Jumbo	21	204
Bangholm Selected (average 4 years)	27	1,132

MANGELS.

Seven varieties of mangels were planted in uniform test rows. The average results for five years are as follows:—

Variety.	Average Yield per Acre.	
	Tons.	Lbs.
Gate Post	29	362
Prize Mammoth Long Red	27	868
Perfection Mammoth Long Red	27	393
Yellow Intermediate	25	776
Half Sugar White	25	326
Selected Yellow Globe	22	503
Giant Yellow Intermediate	19	898

SUGAR BEETS.

Three varieties of sugar beets, suitable for the production of sugar, were planted in uniform test rows. The average results for five years are as follows:—

Variety.	Average Yield per Acre.	
	Tons.	Lbs.
Klein Wanzleben	18	315
Vilmorin's Improved	17	443
French Very Rich	14	1,165

FIELD CARROTS.

Five varieties of field carrots were grown in uniform test rows. The average yields for five years are as follows:—

Vaaiety.	Average Yield per Acre.	
	Tons.	Lbs.
Improved Short White	16	1,407
Mammoth White Intermediate	16	562
Ontario Champion	15	1,007
White Belgian	14	1,080
Half Long Chantenay	13	1,214

POTATOES.

Twenty-nine varieties of potatoes were planted in uniform test rows. The average results for five years are as follows:—

Variety.	Colour.	Form.	Average Earliness.	Average Size.	Average Yield per Acre.	
					Bush.	Lbs.
Ashleaf Kidney	White	Long, flat, smooth.	Late	Large	496	50
Morgan Seedling	Pink & White	Oval	Medium	"	466	2
Late Puritan	White	Long	Late	"	455	2
Early White Prize	"	Oval	Early	Small to medium.	447	42
Money Maker	"	Long, smooth.	Medium	Medium	443	40
American Wonder	"	Long	Late	Large	440	22
Empire State	"	"	Medium	Medium to large.	435	38
Reeves' Rose	Pink	Oval flat	"	Medium	424	14
Irish Cobbler	White	Round, deep eyes.	"	"	421	18
Carman No. 1	"	Oval flat	"	Large	420	42
Everett	Pink	Long	Early	Medium	402	58
Gold Coin	White	Round	Late	Large	398	56
Rochester Rose	Pink		Early	Small	376	56
Dreer's Standard	White	Oval flat	Medium	Medium	359	28
Vick's Extra Early	"	Round	Late	Small	276	38
Dalmeny Beauty	Yellowish White	Oval	"	"	230	16
Manitoba Wonder (average of 4 years).	Red	Long.	Medium	Medium	435	25
Dooley (average of 4 years)	White	Oval flat	"	Large	419	50
Woodbury's White Rose (average of 2 years).	"	Long, rather coarse.	"	Medium	461	55
Early Ohio (average of 2 years.)	Red	Long	Early	Large	456	30
Hamilton's Early (average 2 yrs)	White	Round	"	Medium	456	30
Peacock's Surprise (average 2 years.)	Russet.	Long smooth	Medium	"	416	10
Factor (average of 2 years)	White	Round	Late	Small	350	50
Hard to Beat (average of 2 years)	"	Flat	"	"	254	50
Table Talk (1 year only)	"	Long, flat, smooth.	"	Large	777	22
Early Bovee (1 year only)	Pink	Oval to long	Early	Medium	579	20
Early Harvest (1 year only)	White	Long	"	"	550	..
Saunderson's Seedling (1 year only.)	"		Late	Small	293	20
Ashleaf Kidney (English Type) (1year only)	"	Kidney shape.	Very early.	Very small	275	..

Table Talk, a new variety tried this year for the first time, appears to be a very desirable kind. Not only did it produce a phenomenal yield, but the potatoes are of excellent quality.

GRADES OF WHEAT FOR SEED.

An experiment has been continued for four years to determine the comparative value for seed of the various standard and commercial grades of wheat. Samples of these grains were obtained each year from the Chief Inspector of Grain at Winnipeg. These were sown under uniform conditions, and the yields determined.

Grade.	No. of Days Maturing, 1911 only.	Average Weight per Bushel, 3 Years.	Average Yield per Acre, 3 Years.	
		Lbs.	Bush.	Lbs.
No. 1 Hard	111	60½	39	25
" 1 Northern	110	60¼	39	20
" 2 "	111	60	39	25
" 3 "	112	59¾	38	20
" 4 "	112	59¾	37	53
" 5 "	113	59¾	36	28
" 6 "	114	59¼	33	5
Feed	115	59	29	53

These results were obtained in well-prepared summer-fallow land where circumstances were favourable toward giving the weak seeds in the low grades a good chance. It is reasonable to suppose that in stubble land or under other less favourable conditions, the variations among the grades would be greater.

THE PREVENTION OF SMUT.

It has already been well proven that it is possible to prevent smut in wheat and oats by treating the seed with a solution of either formaldehyde or copper sulphate, commonly known as bluestone. Some difference of opinion exists among farmers and agricultural authorities as to which of these two preventives is the better, and as to what strength of solution gives the best results. The object of this experiment was to throw some light on these questions, keeping in view the effect of the treatment on the vitality of the seed grain as well as its effectiveness in destroying smut spores.

The seed used was Huron wheat, the product of last year's untreated plot. It was strong, plump seed, but quite badly tagged with smut. The results are as follows:—

Treatment.	No. of Smutty Heads per 1,000	Yield.	
		Bush.	Lbs.
Untreated	161	44	40
Immersed in bluestone, 1 lb. to 4 galls. water	..	38	40
" " 1 " 6 "	..	40	40
Sprinkled with " 1 " 6 "	3	40	..
Immersed in " 1 " 8 "	4	44	..
" " 1 " 10 "	5	44	40
" formalin 1 " 25 "	.	38	40
" " 1 " 30 "	..	46	20
" " 1 " 35 "	..	47	40
Sprinkled with " 1 " 35 "	..	45	20
Immersed in " 1 " 40 "	..	48	40

QUANTITY OF SEED PER ACRE.

An experiment was conducted to ascertain what quantity of seed of wheat, oats and barley gives the best results in regard to yield per acre and earliness. The land used was well prepared summer-fallow, with plenty of moisture. In the case of the wheat, the results are uniform and may be considered as reliable as a single test ever is. Both the oats and barley lodged very badly in all plots. The growth of straw was excessive, and the results are irregular and cannot be considered as of much value.

The results are as follows:—

Amount of Seed per Acre.	No. of Days Ripening.	Yield.	
		Bush.	Lbs.
Wheat.			
2 Bush. per acre	112	45	40
1¾ " "	112	44	40
1½ " "	113	44	20
1¼ " "	113	43	20
1 " "	113	40	20
¾ " "	113	39	20
Oats.			
4 Bush. per acre	126	113	18
3½ " "	122	142	12
3 " "	123	115	10
2½ " "	124	133	22
2 " "	126	133	02
1½ " "	126	123	18
Barley.			
3 Bush. per acre	89	69	28
2½ " "	90	79	08
2 " "	91	81	12
1¾ " "	91	81	32
1½ " "	92	77	24
1 " "	92	83	16

DEPTH OF SEEDING.

An experiment was conducted to determine what depth of seeding is best for wheat and for oats. The wheat was sown on land that grew corn, and was well cultivated the previous year. It was harrowed, but not ploughed. The oats were sown on wheat stubble, spring ploughed, packed and harrowed. The results of the experiment are as follows:—

Depth of Seeding—Wheat.	Yield per Acre.		Depth of Seeding – Oats.	Yield per Acre.	
	Bush.	Lbs.		Bush.	Lbs.
1 inch deep	42	20	1 inch deep	82	12
2 inches deep	42	40	2 inches deep	92	32
3 "	39	40	3 "	90	20
4 "	37	00	4 "	83	18

SOIL PACKING.

The practice of packing the soil by means of a soil packer, is one that is widely advocated throughout Western Canada, and one that is being adopted by many of the farmers of Manitoba. Three distinct types of soil packer are offered by the manufacturers. There is first what is called the subsurface packer or Campbell packer, which consists of a number of heavy iron wheels with wedged-shaped edges. This packer is supposed to reach the subsurface, and to compact sideways as well as downwards, on account of the wedge shape of the wheels. There is then the more widely-used surface packer, or corrugated roller, which differs from the former in that the compacting surface of the wheels is broad and flat and presses wholly on the surface of the ground. Then a third packer, called the combination packer, is intermediate in form between the other two.

The purpose of this experiment was to determine, first, whether soil packing is advantageous at all, second, which type of packer gives best results, third, when the packer should be applied. The land on which the experiment was conducted was well prepared summer-fallow. It was thus impossible to compare packing immediately after the plough, with other times. This, however, is being done for the coming year. The result of this year's test is as follows:—

—	Yield per Acre.	
	Bush.	Lbs.
Unpacked—average of 4 plots	45	25
Surface packer before seeding	51	..
Combination packer after seeding	50	20
Subsurface packer before seeding	53	40
Surface packer after seeding	53	40
Combination packer after seeding	55	00
Subsurfaca packer after seeding	54	40
Surface packer and harrow after seeding	54	..
Combination packer and harrow after seeding	55	..
Subsurface packer and harrow after seeding	54	40
Surfaca packer before and after seeding	53	00
Combination packer before and after seeding	52	..
Subsurface packer before and after seeding	55	20

These yields show the decided advantage of using any kind of packer, and any time of application, over no packer. There is not, however, any decided advantage in favour of any one type of packer over the others.

DATES OF SOWING FIELD ROOTS ON THIS FARM.

For many years it has been the custom to sow field roots at two different dates, in order to make a comparison of late and early sowing. The average of these results from five varieties for five years has been taken. The early sowings with mangels were made from May 4 to May 22, depending on the season. The late sowings were approximately two weeks later in each case, running from May 19 to June 5. The varieties of mangels on which these averages have been taken are, Prize Mammoth Long Red, Half Sugar White, Giant Yellow Intermediate, Selected Yellow Globe, and Gate Post.

Time of Sowing Mangels.	Yield per Acre.	
	Tons.	Lbs.
Early sowing	24	1,470
Late sowing	22	770

With turnips, the date of early seeding varied from May 4 to May 22, according to the season, and the late sowing was approximately two weeks later, running from May 9 to June 5. These results are the average for five years on the following five varieties of turnips: Carter's Elephant, Magnum Bonum, Hall's Westbury, Halewood's Bronze Top, Hartley's Bronze.

Time of Sowing Turnips.	Yield per Acre.	
	Tons.	Lbs.
Early sowing	24	1,778
Late sowing	20	1,441

CULTURAL EXPERIMENTS.

The scope of the experimental work on this Farm has been considerably enlarged through the adoption of a system of cultural experiments with grain and fodder crops. This new work will consist of tests of agricultural methods, in distinction to the tests of varieties which have formed such an important part of the work in the past. A block of over 20 acres has been set apart for these cultural experiments and has been surveyed into plots of one-fortieth-acre each. Each experiment is located on a different group of plots and is operated in a rotation, so that each year a fresh series of plots is ready for experimentation, while those previously used go around the rotation, and become prepared for experimental use again.

The land for these plots was surveyed in the spring of 1911. The work in 1911 was largely of a preparatory nature. Most of the experiments require two or more years to perform, and it was therefore impossible to obtain any results the first year. The experimental conditions have been fulfilled on practically all the plots, and in 1912, results will be obtained. The following list shows the scope of the cultural experiments:—

Depth of ploughing. 10 different depths in summer-fallow.
" " 3 different depths in stubble land.
" " 4 different depths in sod.
Treatment of summer-fallow. 17 different methods.
Treatment of stubble land. 13 different methods.
Seeding to grass and clover. 11 different methods.
Breaking up sod from grasses and clovers. 8 different methods.
Applying Barnyard manure. (*a*) On hoed crop—8 different methods compared with summer-fallow.
" " " (*b*) On wheat—7 different methods compared with no manure and summer-fallow.
" " " (*c*) On barley—7 different methods compared with no manure and summer-fallow.
" " " (*d*) On oats—7 different methods compared with no manure and summer-fallow.
Green manuring. 3 different methods compared with barnyard manure and summer-fallow.
Preparation of seed bed. 3 different degrees of preparation.
Soil Packers. (*a*) On summer-fallow—25 different methods.
" (*b*) On spring ploughing—11 different methods.
" (*c*) On fall ploughing—14 different methods.
Depth of seeding. 4 different depths with oats.
" 4 different depths with wheat.
Commercial fertilizers. 8 kinds and combinations, compared with manure, clover, summer-fallow, and no fertilizer.
Underdraining.

ALFALFA AND RED CLOVER.

Alfalfa and Red Clover do very well in Manitoba and deserve much wider use than is made of them at present. The following yields, particularly of alfalfa, are rather unusual, as even in a twenty-acre field of alfalfa sown early in 1910 and not yet at its best, an average yield of 3½ tons per acre was obtained. The following yields are of dry hay, grown from plots sown in 1908 and 1909:—

Variety.	Yield per Acre.				Total Crop.	
	1st Cutting June 21.		2nd Cutting August 7.			
	Tons.	Lbs.	Tons.	Lbs.	Tons.	Lbs.
Alfalfa (Grimm's—Sown 1908)	4	300	2	...	6	300
" (Indian Head Seed)	3	800	2	400	5	1,200
" (Grimm's—Sown 1909)	4	200	1	400	5	200
" (Turkestan)	2	1,750	1	800	4	550
" (Common)	2	1,500	1	1,100	3	2,600
" Canadian Purple Flowered	2	700	1	400	3	1,100
" Canadian Variegated Flowered	2	1,100	..	1,600	3	700
" Provence	2	600	..	1,800	3	400
" Frankish	2	200	1	...	3	200
" Montana	2	300	..	1,800	3	100
" Sand Lucerne	2	500	..	1,600	3	100
" North Turkestan	1	1,700	1	...	2	1,700
Orel Red Clover	1	1,500	1	200	2	1,700
Common Red Clover	2	200	..	1,200	2	1,400

INOCULATION FOR ALFALFA AND CLOVER.

Alfalfa, like all other legumes, is able to utilize the nitrogen of the air in its growth and to this is largely due its value as a soil renovator and a fodder. This important function is performed through the medium of bacteria which find lodgement in the roots of the plants. Their presence is indicated by the formation of small nodules or excrescences on the roots, about the size of a pin head. These frequently appear in bunches and are usually found on the younger parts of the roots. The absence of these nodules is an indication that the soil does not contain the bacteria. The alfalfa will grow the first season without these bacteria being present, but it lacks stamina and vigour, and is apt to succumb during the first winter.

Our prairie soils sometimes have these bacteria present naturally, but otherwise it is necessary to inoculate. This can most readily be done by securing soil from a field where alfalfa has been growing successfully and scattering it over the land at the rate of from 100 to 200 pounds per acre. This may be done to advantage immediately before sowing the seed, but it may, if necessary, be distributed after the alfalfa is growing, as it will be gradually washed in with the rain. It is not always necessary to inoculate the land, but it is always advisable, as the chances of success are thereby increased. The Experimental Farm has offered to supply farmers in Manitoba with 100 pounds of inoculated soil, free of cost, the receiver paying the freight only. During the season of 1911, one hundred and twenty-seven bags of inoculated soil for alfalfa were sent out in this way, and four bags of inoculated soil for red clover.

As these crops are no longer an experiment, and farmers wish to try larger areas than one acre, there is a demand for greater quantities of soil. It has been decided, for 1912, to send 100 pounds per acre, with a limit of 500 pounds to any farmer. Also, as one of the railways refuses to accept this material for shipment except when the freight charges are prepaid, it has been decided to collect a uniform rate of 50 cents per 100 pounds, which, when averaged up, will be about sufficient to pay all freight charges inside Manitoba. For this sum the Experimental Farm will pay the freight to any point within this province.

FERTILIZING EFFECT OF CLOVER.

In order to test the fertilizing effect of clover as compared with grasses, some old plots that had grown grasses and clovers for years, were ploughed up and sown with wheat. The land was treated in the same manner on all the plots and the same seed wheat used on all. The following results were obtained, and show very clearly the effect of the clovers in storing fertility in the soil:—

Condition of crop.	Yield per Acre.	
	Bush.	Lbs.
Wheat following Red Clover	37	5
Wheat following Alsike	33	30
Wheat following Western Rye Grass	27	37
Wheat following Timothy	26	47

ROTATION OF CROPS

In the last annual report, the need of more diversified farming and more systematic crop rotation for the province of Manitoba, was discussed in detail. The proposed work in crop rotations that was to be started on the Experimental Farm, was also described. Since then some changes and additions have been made. In the first place, the naming of the various rotations by letters, has been changed so that they conform to a system extending over all the prairie Experimental Farms. The same rotation now has the same letter, no matter what farm it is on, and no letter is used to designate more than one rotation. Also, a rotation that includes alfalfa as a principal crop has been added to the list, and some rearrangement of crops made in one or two other rotations. The revised list of rotations being tested on this Experimental Farm is as follows:—

A. Continuous wheat.

D. *1st year.*—Wheat, sown on summer-fallowed land, manured in fall, and fall ploughed.
2nd year.—Wheat.
3rd year.—Oats.
4th year.—Summer-fallow.

E. The same as D, except that no manure is applied at any time.

F. *1st year.*—Wheat, sown on land that was in clover the previous year, and ploughed in fall after harvest.
2nd year.—Wheat, land manured after harvest and ploughed.
3rd year.—Corn and roots, sown after the land has been well cultivated a number of times, cultivated at intervals during the summer to stimulate growth and destroy weeds.

4th year.—Oats or barley, sown on corn stubble, after it has been well harrowed. Red clover 8 lbs., timothy 3 lbs., and rye grass 4 lbs., sown with the oats or barley.

5th year.—Hay, ploughed as soon as possible after haying and worked at intervals during summer and fall in preparation for wheat.

G. *1st year.*—Wheat, sown on corn stubble that has been harrowed thoroughly, land ploughed after harvest.

2nd year.—Wheat, land ploughed in the fall if in good condition, or left until spring.

3rd year.—Oats or barley, sown with 8 lbs. red clover and 5 lbs. timothy per acre.

4th year.—Clover hay.

5th year.—Pasture, manured in summer and ploughed as soon after July 1 as possible, worked at intervals during the summer and fall to destroy weeds and conserve moisture.

6th year.—Corn and roots, cultivated at intervals throughout the summer to stimulate growth and destroy weeds.

H. *1st year.*—Wheat sown on land that was in pasture the previous year, land ploughed in fall after harvest.

2nd year.—Wheat disced in fall or early spring.

3rd year.—Summer-fallow, ploughed in June and well cultivated.

4th year.—Oats, sown on summer-fallow, with western rye grass 8 lbs., red clover 6 lbs., and alsike 2 lbs.

5th year.—Clover hay.

6th year.—Pasture, manured in midsummer, ploughed and well cultivated during fall.

I. *1st year.*—Flax, sown on land that was in pasture the previous year, land ploughed in fall after harvest.

2nd year.—Oats, disced in fall or early spring.

3rd year.—Summer-fallow, ploughed in June and well cultivated.

4th year.—Wheat, on summer-fallow, sown with western rye grass 8 lbs., red clover 6 lbs., and alsike 2 lbs.

5th year.—Clover hay.

6th year.—Pasture, manured in midsummer, ploughed and well cultivated during fall.

Q. This rotation arranged specially for a sheep farm, is on a piece of very light, poor land at the back of the Experimental Farm.

1st year.—Roots and peas, sown on land that was in green feed and rape the previous year, and manured and fall ploughed the previous fall.

2nd year.—Wheat, sown with a mixture of grasses and clovers.

3rd year.—Hay.

4th year.—Hay.

5th year.—Pasture.

6th year.—Pasture.

7th year.—Pasture, ploughed in midsummer and backset.

8th year.—Green feed and rape.

W. *1st year.*—Wheat, on land ploughed up from alfalfa.

2nd year.—Wheat, manured in fall after harvest.

3rd year.—Corn or roots.

4th year.—Oats.

5th year.—Barley.

6th year.—Alfalfa sown without nurse crop.
7th year.—Alfalfa.
8th year.—Alfalfa.
9th year.—Alfalfa.
10th year.—Alfalfa, ploughed up in midsummer.

For each of these rotations a block of land has been set apart, on which it will be operated from year to year. Each block is divided into as many fields as there are years in the rotation. The fields vary from 3½ acres to 8¼ acres in size, and are thus sufficiently large to give practical farm conditions. This makes the computation of cost and receipts more reliable than could be secured on small plots. The rotation fields, in all, take up more than half the arable land on the Experimental Farm.

During the past year, rotations D, E and G were in operation in full. Rotations F, H, I and Q were in partial operation. Rotation W has not yet been started. The work on these rotations has not progressed far enough to be reported upon as yet. However, one or two facts are already showing themselves quite strongly. One is the great value of corn in a rotation. Not only is it one of the most profitable crops in the rotations, but, after it, the cheapest grain crops are grown. In 1911, wheat, grown after corn, was produced at a cost of 27 cents per bushel, while on summer-fallow or stubble land it costs 45 cents per bushel to produce. Barley, after corn, was produced at the cost of only 16 cents per bushel.

The cost of producing the crop, and the value of the crop, on every field in the rotations in 1911, have been carefully ascertained, and when several years' results are obtained, definite opinions may be formed as to which rotation is best suited to Manitoban conditions.

EXPERIMENTS WITH LIVE STOCK.

In the arrangement of breeds of cattle among the western Experimental Farms, the breed allotted to this Farm is the Dairy Shorthorn. A herd of 20 animals of this breed was sent out from the Central Experimental Farm at Ottawa in June, 1911. The purpose of keeping this type of Shorthorn, is to meet the growing demand among the grain-growing farmers for a useful general-purpose cow, that will give a fairly large flow of milk and at the same time produce a good beef calf. The herd is descended from some of the best English Shorthorn herds, and contains some very good specimens of the dual-purpose type of Shorthorn. The young males, and some of the females, from this herd will be available for purchase at reasonable prices by farmers of the prairie provinces.

The number of cattle on the Experimental Farm at the present is as follows:—

4 cows and 4 heifers, Shorthorn, beef type.
2 bulls, 13 cows and 17 heifers and calves, Shorthorn dairy type.
1 cow and 1 calf, Ayrshire.
1 cow and 1 calf, Grade.
19 feeding steers, Grade.

The record of milk production for the season of 1911-12, is as follows:—

MILK RECORD FOR YEAR ENDING MARCH 31, 1912.

Name.	Breed.	No. of Days Milking.	No. Lbs. Milk.
Snowball	Ayrshire	366	6,555
Buttercup	Grade	300	5,558
Rose	Shorthorn	303	5,328
Jane	"	255	4,246
Poppy	"	302	2,445
Daisy	"	...	1,981

The following cows belong to the herd of Dairy Shorthorns which arrived here from Ottawa on June 18, 1911. The record of their milk production is dated from June 18, and is as follows:—

MILK RECORD OF DAIRY SHORTHORNS FOR PERIOD EXTENDING FROM JUNE 18, 1911 TO MARCH 31, 1912.

Name.	Breed.	No. of Days Milking.	No. Lbs. Milk.
Illuminata 3rd	Dairy Shorthorn	317	5,048
Ottawa Marchioness 5th	" "	215	4,539
Ottawa Janet 3rd	" "	222	4,326
Jessica Elmhurst	" "	242	3,983
Ottawa Marchioness 4th	" "	285	3,915
Ottawa Marchioness	" "	322	3,842
Ottawa Molly 4th	" "	229	3,760
Ottawa Lass	" "	241	3,690
Marchioness 2nd	" "	290	3,661
Duchess 3rd	" "	314	3,652
Molly 3rd	" "	287	3,162
Molly 2nd	" "	272	3,084
Illuminata 4th	" "	258	2,698

STEER FEEDING.

For several years now a test has been conducted at this Experimental Farm to compare feeding steers outside with feeding in stables. This was repeated in 1911 and is again under way in 1912. A new feature was also introduced in a comparison of alfalfa with grain as part of the feeding ration.

Twenty-one steers were purchased in the fall of 1910 at a cost of $33 per head. They averaged 1,053 pounds, which made the purchase price 3·13½c per pound. They were all rising three, and were chiefly Shorthorn and Hereford grades. They were started on feed on November 15, 1910, and shipped on May 1, 1911. Bids were received from quite a number of buyers from Winnipeg, Brandon and other points. The best bid was 6·30 cents per pound made by W. J. Burchill, of Brandon.

Details of the Feeding.

The twenty-one steers were divided into three lots as evenly as possible in regard to size and quality.

Lot 1 was fed entirely outside without any shelter except the natural scrub and bush. They were supplied with water from a well, pumped into a large trough which was kept from freezing by means of a small tank heater. They were fed straw and,

at the last, hay in large racks, which were filled by the sleighload as required. The grain ration was given on feeding tables. They were started on a ration of two pounds per day of mixed oat and barley chop. This was gradually increased to 11 pounds of chop, 1 pound of bran and 2 pounds of oilcake at the finish. From January 1 on, they got 2 pounds of alfalfa hay per day, chopped and mixed with their grain.

Lot 2 was fed in the stable. They received 8 pounds of straw, 35 pounds of corn silage and 15 pounds of roots daily throughout the experiment and received no hay. They were started on a ration of 2 pounds of mixed oat and barley chop on November 15, and this was gradually increased to 10 pounds of mixed chop, 1 pound bran and two pounds oilcake at the finish of the test.

Lot 3 was fed in the stable as well. They got exactly the same feed as lot 2, except that from January 1 they received 3 pounds less per day of mixed oat and barley chop, and in its place received 3 pounds of alfalfa hay. Their fattening ration besides straw, corn and roots, was, therefore, 7 pounds of mixed chop, 1 pound of bran, 2 pounds oilcake and 3 pounds alfalfa hay per day at the finish of the test. The average amount of concentrated grain feed for the whole period was thus less than 4 pounds per day.

At selling time all three lots looked equally well and were equally saleable. There was not a steer that was not in prime condition. The results obtained are given concisely in the following tabulated statement. The usual custom of balancing labour and interest against manure has been followed. So far as the results of the whole experiment are concerned this is a safe rule, as the manure is certainly worth the labour and the interest on capital involved. It is not, however, a fair comparison between outside and inside feeding, as the work involved in handling a bunch of steers in a stable is much greater than it is for an outside lot.

The interest on investment in stabling accommodation is also a considerable item. These points should be kept in mind in comparing these lots.

RESULTS OF FEEDING EXPERIMENT, 1910-11.

—		Lot 1.	Lot 2.	Lot 3.
No. of steers in lot		7	7	7
" days in experiment		167	167	167
Average weight at beginning of experiment	Lbs.	1,042	1,061	1,056
" " end of experiment	"	1,256	1,285	1,277
" gain	"	215	224	216
" gain per day	"	1·28	1·34	1·29
Quantity of straw eaten by lot during period	"	24,000	9,380	9,380
" hay " "	"	10,000	.....	.....
" alfalfa hay " "	"	1,596	.....	2,835
" corn silage " "	"	.....	39,900	39,900
" roots " "	"	.....	18,725	18,725
" fmeal " "	"	9,082	7,318	4,483
Total cost o fee d	$	144 81	138 91	127 56
Cost of feed per head	"	20 67	19 84	18 22
" " per day	cts.	12·4	11·9	10·9
Cost to produce 1 lb. gain	"	9·6	8·9	8·4
Original cost of steers	$	228 57	232 81	231 55
" plus cost of feed	"	373 38	371 72	359 11
Total receipts from sale at 6·30c. per lb	"	526 68	538 65	532 98
Net profit on lot	"	153 30	166 93	173 87
" per steer	"	21 90	23 86	24 84

Profits in steer feeding.

The striking results of this experiment are, first, a demonstration of the opportunity for western farmers to make better use of their straw and coarse grains by fattening steers at a handsome profit.

Stabling not essential.

Secondly, it is possible to get those results without going to the expense of building stables. Though the gains are better when stabling can be used, they are not sufficient to justify heavy outlay for stables to be used for this purpose alone.

Feeding value of alfalfa.

Thirdly, probably the most striking illustration is that of the wonderful feeding value of alfalfa. The steers that had their grain ration reduced by three pounds and got in its place alfalfa hay, looked just as well as the others, and made practically the same gains. They made the gains more economically. Even though the alfalfa hay was valued at $12 per ton, which will seem to most people a high valuation for unbaled, undelivered hay, yet the steers fed partly on it made their gains considerably cheaper than the ones fed chopped oats and barley valued at 1 cent per lb.

Another experiment of the same kind has been started during the season of 1911 and 1912. Nineteen steers have been divided into two lots; twelve animals are being wintered outside as Lot 1 in the above experiment and some are being wintered in the stable as Lot 2. Satisfactory gains are being made by both lots but at the end of the fiscal year the experiment is not complete.

SWINE.

The stock of swine on hand at present consists of the following animals:—

Yorkshires: 1 boar, 2 sows, 8 young pigs.
Berkshires: 2 sows.
Crossbreeds: 13 young pigs.

No experiments in feeding swine have been conducted during the past year, on account of insufficient number of pigs of equal age.

SHEEP.

The flock of sheep on hand at present consists of the following animals exclusive of newly-born lambs:—

Oxford Down: 1 ram and 2 ewes.
Grade: 30 breeding ewes, and 122 fat sheep.

EXPERIMENT IN FATTENING SHEEP.

In order to obtain information in the feeding of western range sheep by wheat farmers, as a means of disposing of by-products of the farm, an experiment has been conducted. One hundred and twelve range ewes were purchased in November, 1911. These were all fed wheat screenings, consisting of about half shrunken wheat and half wild oats, bought at $16 per ton from a local flour mill. The sheep were divided into four lots. Lot 1 was confined in the sheep barn, sheltered from cold and storm, but given no exercise. Lots 2, 3, and 4 were fed in open paddocks without shelter, but had open sheds to shelter in when not feeding. The three lots fed outside were all fed the same grain, but a comparison was made in the three kinds of roughage. Lot 2 were given alfalfa, lot 3 hay of mixed grasses, and lot 4 straw. Lot 1 received the same feed as lot 3, the only difference being that the hay was weighed to them each day while those outside ate from a large stack.

The sheep were started feeding on December 5, receiving $\frac{1}{4}$ pound per day per sheep of wheat screenings, and all the roughage they would eat. The screenings were increased from time to time, and at the end of the experiment, each sheep was receiving $1\frac{1}{4}$ pounds per day of grain.

They also were all given 2 pounds per day of frozen turnips throughout the experiment. Frozen turnips are commonly supposed to be dangerous; they were therefore fed in small quantities, and a watch for ill effects was kept on the sheep. They ate the turnips quite well until they began to thaw in the spring and no ill effect was observed at any time.

The prices charged for feed in computing cost are:—

Wheat screenings (actual cost)	$16 00	per ton.
Alfalfa hay (rather badly weathered)	10 00	"
Grass hay (rather badly weathered)	8 00	"
Straw	2 00	"
Frozen turnips	1 50	"

RESULTS OF SHEEP FEEDING EXPERIMENT 1911.

—	Lot 1. Fed Hay in stable.	Lot 2. Fed Alfalfa outside.	Lot 3. Fed Hay outside.	Lot 4. Fed Straw outside.
No. of sheep in experiment	10	66	18	18
" days in experiment	126	126	126	126
Total weight at beginning of experiment. Lbs.	981	6,203	1,785	1,768
" end of experiment "	1,150	8,570	2,055	2,025
Gain during period "	169	2,367	270	257
Gain per head "	16·9	35·9	15	14·3
" day per head "	0·14	0·29	0·12	0·12
Quantity of grain eaten by lot "	1,225	8,085	2,205	2,205
" hay (grass) eaten by lot "	1,860	.....	5,400	.....
" alfalfa " "	.....	30,000	.....	5,400
" frozen turnips " "	2,480	16,000	4,000	4,000
Total cost of feed $	18 10	226 68	47 64	26 04
Cost of feed per head "	1 81	2 83	2 65	1 45
" " per day cts.	1·4	2·2	2·1	1·1
" 1 pound gain "	10·7	9·6	17·7	10·1

The sheep have not been sold as yet so that it is impossible to report on the profit or loss of the experiment. It is not likely that it will be possible to show a profit, as too large a price was paid for them in the fall. It was impossible to buy at the right time on account of lack of funds. When funds were made available it was almost impossible to get sheep, and these were bought at a high price for the sake of getting results on a comparison of feeds, even though the operations were carried on at a loss. The price paid was $5.75 each for sheep that averaged 98 pounds weight. In order to have a chance to make a profit, feeders should get this type of sheep for at least $1 each less than this. These prices are for animals laid down in Manitoba. It is proposed to feed lambs in the coming season to see if it is not possible to make more economical gains with them.

The striking result of this experiment is the much greater gains made by the sheep fed on alfalfa than by those fed on hay. They made over twice as great gains. The advantage of the stable-fed sheep over the outside ewes in the cost of gain is largely due to the fact that the ewes in the stable were fed what they would eat each day, while those outside were fed from a large rack that was filled by the sleigh-load, and were very wasteful. Those fed alfalfa were also fed in the same way and greatly increased the cost of feed by wastefulness.

HORSES.

Horses have been kept for work only. The number of work horses has been increased by two during the year. Larger horse force was found to be necessary on

account of the additional work incidental to the cultural experiments. There are twelve heavy horses and two drivers on the Farm at present.

POULTRY.

Small flocks of three breeds are kept, Barred Plymouth Rock, Buff Orpington and Silver Grey Dorking. The number on hand at present is:—

Barred Plymouth Rock	1 cock and 28 hens.
Buff Orpington	6 hens
Silver Grey Dorking	7 "

BEES.

Four hives of bees were brought out of winter quarters in 1911. They multiplied during the season to fourteen hives; these have again been brought through the winter in good condition. The apiary has now been brought up to nearly its former size, and will henceforth be handled to produce honey rather than to multiply.

The average weight of the hives on November 9, when they went into winter quarters, was 44 pounds.

VEGETABLES.

ASPARAGUS.

The asparagus bed planted in 1908, produced a fine crop of shoots. This vegetable is one that might well be brought into more general use. It requires very little work, and produces the first fresh vegetable of the season, being ready for use on May 5 this year.

CARROTS.

Four varieties of carrots were grown; they produced satisfactory yields. The seed bought as Chantenay and as Oxheart did not produce true to type, and yielded carrots not suitable for table use. The yields per acre, calculated from 1 row 66 feet long, are as follows:—

Variety.	Yield per Acre.		Remarks.
	Bush.	Lbs.	
Half Long Chantenay	931	20	Excellent size, shape and quality; very uniform.
Oxheart	909	20	Not true to name.
Chantenay	792	..	A white carrot not true to name.
Early French Horn	660	..	Good early carrot, very uniform and good quality.

PARSNIPS.

Only one variety, the Hollow Crown, was grown this year. It produced a large crop of excellent quality. Part of the crop was harvested in the fall for winter use, and part was left in the ground until spring. That left in the ground came out in first-class condition. The yield per acre estimated from 60 feet of a row, was 416 bushels 40 pounds.

ONIONS.

Several varieties of onions for general use were grown from seed. In the case of Large Red Wethersfield and Yellow Globe Danvers, tests of various sources of seed were made. Dutch Sets and Silver-skin onions, the latter for pickling, were also grown. Onions of all kinds did very well. The yields were as follows:—

Variety.	Yield per Acre.		Description.
	Bush.	Lbs.	
Southport Red Globe	469	20	Round, red.
Yellow Globe Prizetaker	451	..	Round, yellow.
Sutton's Selected Ailsa Craig	434	40	Round, white, rather late.
Large Red Wethersfield (Vilmorin)	410	40	Flat, red, early.
Large Red Wethersfield (Steele-Briggs)	363	..	"
Large Red Wethersfield (Ont. Seed Co.)	330	..	"
Yellow Globe Danver's (Ont. Seed Co.)	399	40	Round, yellow, early.
Yellow Globe Danver's (Vilmorin)	344	40	"
Salzer's Wethersfield	366	40	Flat, red.
Johnson's Dark Red Beauty	300	40	"

BEETS.

Nine varieties of beets were grown; they produced heavily but were inclined to be coarse-grained.

Variety.	Yield per Acre.		Description.
	Bush.	Lbs.	
Eclipse	968	..	Very coarse, early.
Ruby Dulcet	946	..	Good colour, but coarse texture.
Early Blood Red Turnip	946	..	Very coarse, early.
Meteor	806	40	Uniform size and shape, fair colour and quality.
Egyptian	667	20	Coarse, early.
Early Flat Egyptian	594	..	Not true to name, long and unshapely, early.
Rennie's Intermediate	579	20	Rather coarse, fair colour.
Black Red Ball	528	..	Small, excellent quality, shape and colour.
Sutton's Dark Red	300	40	Small long beet, excellent quality.

KOHL RABI.

Early Erfurt Kohl Rabi was grown this year. It was sown on May 9, and was ready for use on July 20. It produced abundantly.

CABBAGE.

Three varieties of early cabbage were grown. They were sown in hotbeds on April 10, and transplanted to the garden on June 6. The Extra Early Paris Market was ready for use on July 25, the Extra Early Midsummer Savoy on August 1, and the Early Jersey Wakefield on August 2. The Extra Early Paris Market and the Early Jersey Wakefield both produced cabbage of first-class quality, the other variety is not quite so good.

Thirteen late varieties were sown at the same time; they produced well.

Variety.	Weight of Specimen Head.
	Lbs.
Flat Swedish	22½
Large Late Flat Dutch	22
Amager	20½
Lubeck	20
Danish Ballhead	20
Danish Summer Ballhead	17½
Copenhegen Market	16
Winningstadt	15½
Madgeburg	15½
Improved Amager Danish Roundhead	15
Red Danish Stonehead	9
Red Danish Delicatesse	8½
Extra Dark Red Dutch	6

CAULIFLOWER.

The following six varieties of cauliflower were grown: Sutton's White Queen, Extra Selected Early Erfurt, Earliest Dwarf Erfurt, Danish Giant or Dry Weather, Earliest Snowball, Early Snowball. The Extra Selected Early Erfurt was the first to be ready for use, and Sutton's White Queen produced the finest specimens.

SQUASH, PUMPKINS, MARROWS, MELONS, CITRONS, ETC.

The season was too cool for these crops to do well. Only the earliest varieties matured, and they ripened but few specimens. The Mammoth Whale squash, and the Long White Bush marrow ripened fruit.

LETTUCE.

Twelve varieties of lettuce were grown, and all except the Red Edged Victoria did very well. The following are worthy of special mention. Wheeler's Tom Thumb, very early, good quality, small; Iceberg, excellent quality, productive and long season. Cos Trianon, late, excellent quality.

PEAS.

Ten varieties of peas were grown for use as green peas. They produced well, and there were peas at the proper stage for use from July 10 until September.

TOMATOES.

The season was not very favourable to tomatoes; a severe sandstorm early in the season injured the stems, and nearly cut off some of them. Then the very cold weather in July and August was not conducive to ripening.

A comparison was made between staking and pruning the plants, and leaving them to grow in their natural habit. The only ripe fruit produced was on the vines that were staked and pruned. The following are the yields of three plants:—

RESULTS OF TESTS WITH TOMATOES, 1911.

Three Plants of each Variety.	PRUNED.			UNPRUNED.		
	Ripe.	Green.	Total.	Ripe.	Green.	Total.
	Lbs. Ozs	Lbs. Ozs.	Lbs. Ozs.	Lbs. Ozs.	Lbs. Ozs.	Lbs. Ozs.
Earliana C E.F. (home grown seed)....	2 3	6 10	8 13	.. 8	16 12	17 4
" C.E.F.....	2 9	5 12	8 5	.. ..	23 ..	23 ..
" Burpee.....	2 ..	4 4	6 4	.. ..	9 ..	9 ..
" Ontario Seed Co.....	1 12	8 4	10 ..	.. ..	15 ..	15 ..
" Northern Adirondack.....	.. ..	5 3	5 3	.. ..	7 8	7 8
Early Jewell, Ontario Seed Co.....	2 3	3 12	5 15	.. ..	8 ..	8 ..
" " Burpee	1 14	9 4	11 2	.. ..	17 8	17 8
Rennie's XXX Earliest	.. ..	4 12	4 12	.. ..	25 8	25 8
Florida Special.....	.. ..	5 4	5 4	.. ..	5 8	5 8
First of All.....	.. 5	1 2	1 7	.. ..	14 ..	14 ..
Bonny Best.....	.. ..	8 8	8 8	.. ..	21 ..	21 .
Red Pear.....	.. ..	1 4	1 4	.. ..	4 ..	4 ..

TABLE CORN.

Nine varieties of table corn were grown. Early Malakoff, C. E. F. strain, proved to be the earliest, being ready for use on July 30. On account of the cool weather, all varieties were later than normal, but the absence of early fall frosts allowed of their use to a much later date than usual. Golden Bantam and the Chase produced corn of excellent quality.

CELERY.

The celery was sown in hot-beds on April 11, and transplanted to the garden on June 15. It was only a moderate success this year and was not of first-class quality. Paris Golden Yellow was the best.

FRUITS.

STRAWBERRIES.

Ten varieties of strawberries have been growing since 1909. They all wintered well and some of them produced a good crop of fruit of first-class quality. The following are the yields obtained from an 85-foot row of each variety:—

Variety.	Size of Berry.	Yield.	
		Lbs.	Ozs.
Crescent.....	Small to medium.....	22	4
Pocomoke.....	Large.....	16	11
Entrance.....	Medium.....	6	8
Lovett	Medium to large.....	5	11
Tennessee Prolific.....	"	5	6
Clyde.....	"	4	15
Splendid.....	Large.....	4	13
Senator Dunlap.....	"	3	15
Bederwood	Medium.....	3	14
Uncle Jim.....	Large.....	1	10

APPLES.

It is still impossible to claim any great success in the growing of apples. No standard apple trees produced any fruit this season, and many of the trees are in an unhealthy condition due to severe winter-killing. Some of the hardier cross-bred apples produced fruit but only in small quantities. The spaces in the orchard, caused by deaths, were again filled with young trees, sent by the Dominion Horticulturist from Ottawa, and from Winona, Ont.

PLUMS.

Plums produced freely this year. Some of the best strains of native plum were ripe on August 15. The best selections of native plum produce fruit of very good quality, and as they are very hardy, every farmer in Manitoba should have some trees of this type. Seedlings of the Cheney plum also produced heavily and the absence of early frosts allowed them to mature. Some of their fruit was of excellent quality.

FLOWERS.

The usual variety of annuals were started in hot-beds and transplanted to the flower garden. They produced a great display that was much admired. Sweet peas sown in the open on April 20 did very well and gave a profusion of bloom which lasted till September 20.

The perennials again proved a great source of delight; from the time the iris started in the early spring, till the autumn daisies were destroyed by the late fall frost, the perennial beds were a constant source of bloom. Pæonies were especially pleasing this year. The perennials are the kind of flower that the farmers of the West should use more extensively. Once planted they require little attention, and bloom year after year, each in its season. The following kinds of perennials are quite hardy: Iris, Pæony, Larkspur, Rosa rugosa, and Autumn Daisy. There are many others that may be successfully grown, but these five are so specially hardy and in themselves extend the blooming period so well over the whole summer, that the simplest prairie home might well have them.

BULBS.

A consignment of bulbs sent by the Dominion Horticulturist were planted in the fall for winter and spring bloom. For interior use, the hyacinths and daffodils were very successful, and for outside planting tulips are the hardiest. They produced an excellent show of bloom.

AGRICULTURAL MEETINGS.

During the year, I attended a number of agricultural meetings. Seed Fairs were attended at Swan Lake, Morden, Deloraine, Hartney, Birtle, Binscarth and Russell. At each of these points I addressed an audience of farmers on agricultural topics; the subjects most frequently discussed were 'Rotation of Crops,' 'Corn Growing,' 'Alfalfa.' I gave an address on 'Growing and Feeding Alfalfa' at the annual meeting of the Manitoba Cattle Breeders' Association, on March 5. I acted as judge at the Saskatchewan Provincial Seed Fair at Saskatoon and at the Manitoba Provincial Seed Fair at Brandon.

CORRESPONDENCE.

Since the last report 3,715 letters were received and 3,757 dispatched.

DISTRIBUTION OF SAMPLES.

The distribution of samples of potatoes and of trees and shrubs has been continued and, during the year, the following material has been sent out:—

Seedling trees and shrubs, packages	126
Potatoes in 3-lb. bags	115

METEOROLOGICAL RECORD.

Months.	Highest Temperature. F.	Lowest Temperature. F.	Total Rainfall.	Total Snowfall.	Hours. Bright Sunshine.
1911.			Ins.	Ins.	
April	83·8	11	.30	2	241·9
May	90	21	2.18	5	208
June	96	35	1.97		195·5
July	92·5	40	2.91		275·3
August	87·7	32	5.84		245·3
September	76·5	21	1.43		165·6
October	76·5	7	1.60		125·6
November	50·8	−28·2		6	132·9
December	36·5	−35		3	47·7
1912.					
January	25·9	−45		.3	135
February	34	−27·7		.3	89·1
March	41·9	−25·2	.07	2	201·2
			16.30	18.6	2063·1

Reckoning 10 inches of snowfall as equivalent to one inch of rainfall, the total precipitation for the year ending March 31, 1912, was 18·16 inches.

I have the honour to be, sir,
Your obedient servant,

W. C. McKILLICAN,
Superintendent.

EXPERIMENTAL FARM FOR SOUTHERN SASKATCHEWAN

REPORT OF ANGUS MACKAY, SUPERINTENDENT.

INDIAN HEAD, SASK., March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to submit to you the twenty-fourth annual report of the Experimental Farm for Southern Saskatchewan, at Indian Head, for the year ending March 31, 1912.

Thet past season was, without exception, the most unfavourable for the country that has taken place for the past twenty-four years. While crops over the entire Province were very promising up to the 1st of August, cold and wet weather then set in, bringing rust and frost before the wheat crop had matured, causing great loss in yield and quality.

Wet weather seriously delayed the ripening, harvesting and threshing, and at present a great deal of the grain is in stooks or uncut.

Had the August weather been at all favourable, one of the largest crops ever grown in any country would have been reaped.

The winter of 1910-1911 was, on the whole, favourable, with a large quantity of snow, while the winter now about over has been remarkable for entire absence of storms, little snow and excessive cold during part of January, and fine weather both before and after the severe cold spell.

Seeding was general about the middle of April throughout the Province and grain made good progress and was very promising every where until rust and frost visited the country.

With the exception of 1901, the crops on the Experimental Farm were never more uniformly good than in the year just past. While rust and frost, chiefly the former, injured the wheat and peas in yield and quantity, the oats, barley, roots, grasses, clovers, potatoes, etc., were all good.

Seeding commenced on April 17, harvest on August 17 and threshing on September 19. Threshing was completed on October 23, over one month later than the previous year.

I am sorry to report the total loss by fire, on the 9th of January, of the barn and horse stable, caused by an explosion of gasoline while starting engine for cutting and grinding feed for the stock. The fire started at 11 a.m. The stock of all sorts was safely got out of the building excepting one brood sow that inhaled too much smoke and died a few days afterwards.

All machinery in the barn including threshing, fanning mills, cutting box, etc., were destroyed.

About four thousand bushels of grain and fifty to sixty tons of hay were lost. The grain included nearly all seed sold, and that for this year's requirements.

In addition to the loss of barn and stable, the new silo and engine-house were consumed. The contents of the silo were not injured, but the engine was greatly damaged.

An outside office is now being erected, and as soon as weather permits, new and improved buildings will be erected in the place of those destroyed.

TESTS OF VARIETIES.

Eighteen varieties including eight unnamed sorts produced by the Dominion Cerealist, were sown on the 19th of April, in plots of one-twentieth acre each, at the rate of one and one-half bushels of seed per acre.

The weather was fine during seeding, and the land being in good condition, grain came up evenly.

Rust injured nearly all varieties, Preston and Marquis alone being unhurt, Early Red Fife, which did so well in 1910, was entirely ruined.

Frost caught some of the late sorts but no great injury was done as rust had preceded it.

SPRING WHEAT—UNIFORM TEST PLOTS—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per Measured Bushel after Cleaning.
							In.	Lbs.	Bush. Lbs.	Lbs.
1	Bishop	April, 19	Aug. 29	132	38	10	3	2,880	48 ..	57
2	Early Red Fife	" 19	" 29	132	36	10	3½	1,540	25 40	55
3	Huron	" 19	" 31	134	37	10	3½	2,720	45 20	57
4	Kubanka (durum wheat)	" 19	Sept. 5	139	53	6	3¼	2.040	34 ..	57
5	Marquis	" 19	Aug. 28	131	40	10	3½	3,020	50 20	61½
6	Preston	" 19	" 29	132	42	8	3¼	2,740	45 40	60
7	Red Fife, H	" 19	Sept. 4	138	40	10	3¼	1,580	26 20	57
8	Stanley, A	" 19	Aug. 31	134	39	8	3½	2,720	45 20	56
9	White Fife	" 19	Sept. 6	140	41	6	4½	2,080	34 40	54
10	Red Fife (from Chemist)	" 19	" 4	138	39	8	3¼	2.120	35 20	57
11	Huron (treated with Formalin)	" 19	Aug. 31	134	38	10	3½	2,720	45 20	57½
12	" (" " Blue stone)	" 19	" 31	134	38	10	3½	2,900	48 20	57
13	" (untreated)	" 19	" 31	134	38	10	3½	2,980	49 40	57
14	83 E	" 19	" 17	120	39	10	2½	2,360	39 20	60
15	107 A	" 19	" 22	125	40	10	3¼	2,220	37 ..	58
16	128 B	" 19	" 22	125	41	9	3	2,480	41 20	58½
17	135 B	" 19	" 10	113	32	10	2½	2,320	38 40	64
18	195 F	" 19	" 21	124	41	9	3	2,580	43 ..	61½
19	354 C	" 19	" 21	124	41	10	2½	2,460	41 ..	59¼
20	378 A	" 19	" 21	124	44	8	2½	2,200	36 40	58
21	397 D	" 19	" 19	122	38	10	2½	2,240	37 20	59

The land was rye grass sod broken and backset the previous year.

WHEAT IN FIELD LOTS.

Five varieties of wheat were grown in field lots, Red Fife, Early Red Fife, Marquis, Preston and Huron, all but Early Red Fife giving good yields.

On fallowed land, frost overtook all varieties before being fully matured. Marquis wheat on pea and stubble land escaped frost entirely, while on fallow it was frozen except on high parts of the field.

Red Fife on new land broken and backset, gave a large yield, with all but that on high ground frozen. Preston and Huron were also frozen except on high parts of the field.

WHEAT—FIELD LOTS—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Marquis (fallow)	April 18	Aug. 26	130	47	10	3¼	2,400	40	..	62·3
2	Marquis (pea land)	" 17	" 16	121	39	10	3⅛	2,683	44	43	65·6
3	Marquis (stubble)	" 22	" 18	118	44	10	3¼	2,425	40	25	65·6
4	Red Fife (backsetting)	" 18	Sept. 2	137	46	10	3	2,890	48	10	62·1
5	Red Fife (fallow)	" 24	" 8	137	48	10	3	2,497	41	37	62·2
6	Red Fife (root land)	" 24	Aug. 31	129	50	10	3	2,608	43	28	63
7	Red Fife (stubble)	" 25	Sept. 2	130	41	10	2½	1,980	33	..	58·8
8	Red Fife (stubble)	" 25	" 2	130	40	10	2⅜	1,567	26	7	58·8
9	Early Red Fife (fallow)	" 17	Aug. 30	135	49	10	2⅝	1,122	18	42	53·5
10	Huron (fallow)	" 20	" 31	133	52	10	3½	3,060	51	..	60·2
11	Preston (fallow)	" 19	" 26	129	49	10	3¾	2,610	43	30	61

SPRING WHEAT—Average and Total Yields.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs
Marquis	Fallow	10·81	40	..	435	33
Marquis	Pea Land	7·09	44	43	315	45
Marquis	Stubble	6·30	40	25	261	10
Red Fife	Backsetting	12·16	48	10	585	45
Red Fife	Root Land	5·06	41	37	224	25
Red Fife	Fallow	5·04	43	28	234	31
Red Fife	Stubble	5·08	33	..	191	38
Red Fife	"	5·08	26	7	151	30
Early Red Fife	Fallow	10·96	18	42	205	16
Preston	"	3·13	43	30	136	21
Huron	"	2·86	51	..	145	51
		73·57			2,887	45

Average yield per acre : 39 bushels, 15 lbs.

SPRING WHEAT—Five Years' comparison of Field Lots.

The average yield per acre and the time taken to mature of four varieties of wheat grown in field lots under similar conditions for the past five years, are given below.

Variety.	Average Days to Mature.	Days earlier than Red Fife.	Average Yield per Acre.	
			Bush.	Lbs.
Huron	127·8	7·8	35	19
Marquis	126·8	8·8	39	24
Preston	128·6	7	35	59
Red Fife	135·6	...	27	24

OATS—TEST OF VARIETIES.

Fifteen varieties were sown on the 15th of May on hay land broken and backset the previous year. Two bushels of seed were sown per acre.

All gave heavy yields of grain and large crops of straw, which was badly lodged by winds and rain.

Frost overtook all but two varieties before they were fully matured. Germination was not greatly injured.

OATS—UNIFORM TEST PLOTS—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Abundance	May 5	Aug31	118	54	8	9	4,400	129	14	38½
2	Abundance, Regenerated	" 5	" 31	118	53	8	9	4,280	125	30	40⅓
3	Banner	" 5	Sept 2	120	48	9	9½	4,500	132	12	39
4	Danish Island	" 5	" 2	120	44	10	10	4,860	142	32	40
5	Golden Beauty	" 5	" 1	119	42	10	7	4,000	117	22	39
6	Gold Rain	" 5	Aug31	118	44	10	8	4,700	138	8	42
7	Improved American	" 5	Sept 2	120	44	10	8½	4,520	132	32	40½
8	Improved Ligowo	" 5	Aug31	118	50	9	8	4,340	127	22	41
9	Irish Victor	" 5	Sept 2	120	43	10	8	5,000	147	2	40
10	Pioneer (black)	" 5	" 4	122	40	10	8¾	3,980	117	2	37
11	Siberian	" 5	Aug25	112	47	9	9	4,320	127	2	39
12	Swedish Select	" 5	" 21	108	46	9	8½	4,046	119	14	40
13	Thousand Dollar	" 5	" 30	117	46	10	8	4,000	117	22	40
14	Twentieth Century	" 5	Sept 1	119	48	10	9	3,484	102	16	40
15	Victory	" 5	" 4	123	49	9	8¾	4,600	135	10	40
16	Banner (treated, formalin)	" 5	" 2	121	48	9	9	4,560	134	4	39
17	Banner (untreated)	" 5	" 2	121	48	9	9	4,940	145	10	39½

OATS IN FIELD LOTS.

Four varieties of oats were sown on summer-fallow and stubble land. Four bushels of Regenerated Abundance and two bushels of the other sorts were sown per acre.

Improved Ligowo was sown on the 3rd, Dodds' White on the 4th, Abundance on the 5th and 6th and Banner on the 9th of May.

All varieties were heavy in straw, badly lodged and late in ripening.

OATS—FIELD LOTS—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per Measured Bushel after Cleaning.
					In.		In.	Lbs.	Bush.	Lbs.	Lbs.
1	Abundance (fallow)	May 6	Aug. 30	116	60	5	8¼	3,301	97	3	43·2
2	Banner (stubble)	" 10	" 30	112	46	8	6	1,997	58	25	38
3	Banner (fallow)	" 8	Sept. 4	119	54	7	7	3,163	93	1	39·2
4	Banner (stubble)	" 10	" 2	115	48	8	8	1,760	51	26	40·5
5	Improved Ligowo (fallow)	" 3	Aug. 30	119	58	8	8¼	2,720	80	..	40·8
6	Dodds White (fallow)	" 4	" 28	116	60	10	8	1,852	54	16	43·5

OATS—Average and Total Yields.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Abundance	Fallow	16·54	97	3	1,608	..
Banner	Spring ploughing	5·06	58	25	331	..
Banner	Fallow	9·51	93	1	891	12
Banner	Spring ploughing	5·06	51	26	291	28
Improved Ligowo	Fallow	10·02	80	..	816	04
Dodds White	"	·50	54	16	27	08
		46·69	..	..	3,965	18

Average yield per acre: 84 bushels, 31 pounds.

EXPERIMENTS WITH BARLEY.

The barley tests both in uniform plots and field lots were very satisfactory. The yields in all varieties were good, but owing to the unfavourable weather during harvest the quality was somewhat impaired.

BARLEY—TEST OF VARIETIES.

Eleven varieties of six-row and eight varieties of two-row barley were sown on the 26th and 27th of April, at the rate of two bushels of seed per acre on plots of one-twentieth acre each. The land was rye grass sod broken and backset the previous year.

BARLEY—SIX-ROW—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after Cleaning.
					In.		In.	Lbs.	Bu.	Lbs.	Lbs.
1	Claude	April 26..	Aug. 13..	109	46	9	2⅜	3,920	81	32	52⅓
2	Mansfield	" 26..	" 9..	105	48	9	2¾	4,400	91	32	52
3	Manchurian	" 26..	" 13..	109	48	8	3½	4,380	91	12	49
4	Nugent	" 26..	" 11..	107	45	8	3	4,360	90	40	51½
5	O. A. C. No. 21	" 26..	" 11..	107	49	10	2⅓	4,200	87	24	50
6	Odessa	" 26..	" 11..	107	44	8	2	4,100	85	20	49
7	Oderbruch	" 26..	" 9..	105	40	10	2¼	3,740	77	44	52½
8	Stella	" 26..	" 11..	107	42	10	2½	4,120	85	40	49½
9	Trooper	" 26..	" 11..	107	46	10	3	3,760	78	16	51
10	Yale	" 26..	" 13 .	109	42	10	2½	3,820	79	28	51
11	Mensury	" 26..	" 11..	107	46	10	3	3,880	80	40	50
12	Mensury (treated with formalin)	" 26..	" 11..	107	44	10	2½	4,040	84	8	50
13	Mensury (untreated)	" 26..	" 14..	110	42	10	2¾	3,680	76	32	50½

Barley—Two-row—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after Cleaning.
					In.		In.	Lbs.	Bu. Lbs.	Lbs.
1	Canadian Thorpe..	April 27..	Aug. 17..	112	44	10	3½	3,600	75 ..	53
2	Clifford.....	" 27..	" 11..	107	44	10	4	3,340	69 28	52
3	Danish Chevalier..	" 27..	" 16..	111	36	10	4	3,980	82 44	53½
4	Hannchen.....	" 27..	" 16..	111	34	9	3½	4,120	85 40	54
5	Invincible.....	" 27..	" 19..	113	45	10	3	3,560	74 8	52½
6	Jarvis, ...	" 27..	" 12..	108	45	10	4½	2,960	61 32	51½
7	Standwell.....	" 27..	" 21..	115	48	10	3	3,504	73 36	53
8	Swedish Chevalier..	" 27..	" 21..	115	44	8	3	3,360	70 ..	52½

Barley—Field Lots—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after Cleaning.
					In.		In.	Lbs.	Bush. Lbs.	Lbs.
1	Manchurian backsetting.....	May 3.	Aug. 18.	107	48	5	3½	3,826	79 34	51·5
2	Manchurian (summerfallow)..	Apr. 29.	" 20.	113	46	5	3	3,408	71 ..	50·5
3	Mensury (summerfallow).....	May 1.	" 17.	108	40	6	2½	3,196	67 ..	49·5
4	Canadian Thorpe (corn land)..	Apr. 28.	" 19.	113	43	7	3	3,456	72 ..	53·5
5	Hannchen (summerfallow)....	May 2.	" 28.	118	39	8	3	3,796	79 4	53
6	Brewers (summerfallow).. ...	" 10.	Sept. 4.	117	42	5	3	3,720	77 24	....

Barley—Average and Total Yields.

Variety.	Cultivation.	Acres.	Yield per Acre.		Total Yield.	
			Bush.	Lbs.	Bush.	Lbs.
Manchurian.....	Backsetting.	5·14	79	34	409	34
Manchurian	Fallow.	5·20	71	..	368	24
Mensury.....	"	10·27	67	..	689	..
Canadian Thorpe	Corn land	3·26	72	..	235	19
Hannchen.....	Fallow.	3 30	79	4	261	40
Brewers.....	"	1·21	77	24	94	05
		28·38			2,058	26

Average yield per acre, 72 bushels and 25 pounds.

PEAS—UNIFORM PLOTS.

Twelve varieties were sown on April 26 on fallowed land, in plots of one-twentieth acre each.

Arthur was well ripened before frost came and was not injured. All other sorts were greatly hurt.

PEAS—FIELD LOTS.

Two varieties were sown on April 27 on fallowed land. Owing to the cold, wet season the growth of straw was large and the crop was late in maturing but notwithstanding this the yield was the largest yet produced on the Farm. Arthur was not injured in quality or germination.

PEAS—Uniform Test Plots.

Name of Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.
							Ins.	Ins.		Bush. Lbs.
Arthur	Clay loam.	1·20	April 26	Sept. 2	129	Strong..	57	2⅛	Large ..	39 ..
Black-eye Marrowfat ..	"	1·20	" 26	" 12	139	"	67	1⅝	" ...	29 40
Chancellor	"	1·20	" 26	" 14	141	"	96	2¾	Small ..	37 20
Daniel O'Rourke	"	1·20	" 26	" 16	143	"	89	2	" ...	33 ..
English Grey	"	1·20	" 26	" 21	148	"	62	2⅛	Large ..	38 20
Golden Vine	"	1·20	" 26	" 15	142	"	70	2	Small ..	34 20
Gregory	"	1·20	" 26	" 23	150	"	62	3	Medium	43 20
Mackay	"	1·20	" 26	" 10	137	"	60	2⅛	Large ..	39 ..
Paragon	"	1·20	" 26	" 16	143	"	72	2⅛	Medium	37 ..
Picton	"	1·20	" 26	" 16	143	"	74	2¼	"	39 ..
Prince	"	1·20	" 26	" 19	146	"	84	2⅜	Small ..	38 20
Prussian Blue	"	1·20	" 26	" 21	148	"	68	2¼	Medium	37 20

PEAS—FIELD LOTS.

Name of Variety.	Character of Soil.	Size of Plot.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Character of Growth.	Length of Straw.	Length of Pod.	Size of Pea.	Yield per Acre.	Weight per Bushel.
							Ins.	Ins.		Bush. Lbs.	Lbs.
Arthur	Clay loam.	3·98	April 27	Sept. 2	128	Strong..	86	2½	Large	52 48	65
Golden Vine	"	4·70	"	" 8	134	"	90	2	Small	62 10	63

FALL WHEAT.

Two varieties of fall wheat were sown in the fall of 1910, Alberta Red on September 1, and Azima on the same date.

Both sorts were more than half killed by spring frosts. The grain from the remainder was inferior.

The yield per acre for Alberta Red was 22 bushels and 11 lbs.; the yield for Azima was 20 bushels and 32 lbs. per acre.

FALL RYE.

Fall rye was sown on the 1st of September, 1910, and as usual gave a good yield, 32 bushels and 1 lb. per acre. For early pasture nothing can surpass fall rye.

TARES AND HAIRY VETCH.

Common black tares gave a yield of 2 tons per acre, but seed did not ripen on account of frost.

Hairy vetch gave the same yield as tares but were only in blossom when frost came, and are not early enough for this country.

CANARY GRASS.

One-twentieth acre of this grass were sown, giving one and one-half tons of feed per acre.

FLAX.

The following varieties of flax were sown on fallowed land on 18th May and gave a very heavy crop of straw.

The varieties were stored in the barn and not threshed before the fire, and were destroyed.

La Plate, Russian, Common, White Flowering and Dutch. All but the former ripened before frost came.

Four seedings of Common flax were made on plots one-twentieth of an acre each, to determine the results of seeding on different dates.

The first seeding was made on May 5, 2nd on May 10, 3rd on May 20, and the 4th on May 30. The results of this experiment will be found below.

FLAX—DIFFERENT DATES OF SEEDING.

Variety.	Size of Plot.	Date Sown.	Date Ripe.	Days Maturing.	Average length of Straw.	Character of Straw.	Weight of Straw per acre.	Yield per Acre.	
					In.		Tons. Lbs	Bus.	Lbs.
Common Flax	1/20	May, 5	Aug. 30	117	27	Strong	1,840	34	36
"	1/20	" 10	Sept. 1	114	30	"	1 420	33	52
"	1/20	" 20	" 6	109	30	"	1 1,580	30	20
"	1/20	" 30	" 20	213	30	"	1 1.672	28	32

FLAX—SOWN ON SPRING BREAKING.

Variety.	Size of Field.	Date Sown.	Date Ripe.	Days Maturing.	Average length of Straw.	Character of Straw.	Yield per Acre.	
	Acres.				Inches.		Bus.	Lbs.
Common Flax	2	May, 15	Aug., 30	107	25	Strong	16	23

SUMMARY OF CROPS—1911.

Wheat.

		Bus.	Lbs.
5	Varieties in field lots, 51·31 acres	1,841	44
4	Rotation plots, 22·26 acres	1,044	01
21	Uniform test plots	42	13
	Cultural Experiment plots	224	
		3,151	58

Oats.

4	Varieties in field lots 36·57 acres	3,342	24
2	Rotation test plots 10·12 acres	622	28
17	Uniform test plots	109	14
	Cultural Experiment plots	190	
		4,264	32

Barley.

4	Varieties in field plots, 18·04 acres	1,280	16
2	Rotation test plots 10·34 acres	778	10
21	Uniform test plots	54	21
	Cultural Experimental plots	19	
		2,131	47

Peas.

2	Varieties in field lots 8·68 acres	432	31
12	Uniform test plots	22	15
		454	46
	Fall Rye	18	50
	Flax	48	21
	Fall Wheat	5	06
	Potatoes	260	
	Roots	2,500	
		Tons.	
	Corn ensilage	125	

Hay.

Western Rye Grass	25
Western Rye Grass and Red Clover	12
Alfalfa	24
Cut in coulees	12

ROTATIONS.

The following rotations are now under way: 'C,' 'P' and 'R.' Land has also been prepared and two new rotations, 'A' and 'J,' will be commenced in 1912.

ROTATION, 'A.'

A field of three acres which was formerly in brome grass pasture has been broken and backset, and will be put in wheat continuously.

ROTATION, 'J.'

A field of 30 acres has been prepared in a similar manner, laid out in six equal divisions and will be put under the following rotation, 1st year Summer-fallow, 2nd year Wheat, 3rd year Wheat, 4th year Oats, seeded to Rye-Grass, Red Clover and Alfalfa, 5th year Hay, 6th year Pasture.

ROTATION 'C.'

Commenced in 1911, Duration, Eight Years.

Description of Rotation: 1st year, Summer-fallow, 2nd year, Wheat, 3rd year, Wheat. Size of Plots, 6¼ acres.

Number of Plot.	Variety.	Preparation of Soil.	Date Sown.	Date Ripe.	Days Maturing.	Length of Straw including Head.	Strength of Straw.	Length of Head.	Yield per Acre.	
									Bus.	Lbs.
1	(Fallow).....	Barley stubble...	.....	.....	.....	.....	.....	.....	.....	.....
2	Red Fife.....	" " ...	April, 25	Sept. 2	130	40	10	2½	26	7
3	Red Fife.....	Oat stubble.....	" 25	Aug. 31	128	41	10	2½	33	..

ROTATION 'P.'

Commenced in 1910, Duration Nine Years.

Description of Rotation:—1st year Summer fallow, 2nd year Wheat, 3rd year Wheat, 4th year Summer fallow, 5th year Roots, 6th year Barley, seeded to a mixture of Rye Grass, Red Clover and Alfalfa, 7th year Hay, 8th year Pasture. Plots, 6 acres each.

Plot No.	Variety.	Preparation of Soil.	Date Sown.	Date Ripe.	Days Maturing.	Length of Straw including Head.	Strength of Straw.	Length of Head.	Yield per Acre.	
						In.			Bush.	Lbs.
1	(Fallow).....	Breaking....	.....	.....	.....	.....	.....	.....	.....	.....
2	Red Fife.....	Backsetting.	April 18	Sept. 2	137	46	10	3	48	10
3	Red Fife.....	"	" 18	"	137	46	10	3	48	10
4	(Fallow)	Breaking....	.....	.....	.....	.....	.....	.....	.....	.....
									Tons	Lbs.
5	Fodder Corn.....	"	May 22	.....	.....	.....	.....	.....	18	300
									Bush.	Lbs.
6	Barley S. D	"	" 3	Aug. 18	107	48	5	3½	79	34
7	Grass seed.....	"	.....	.....	.....	.....	.....	.....	.....	.....
8	Grass seed.....	"	.....	.....	.....	.....	.....	.....	.....	.....

ROTATION 'R.'

Commenced in 1910, Duration Nine Years.

Description of Rotation:—1st year Summer fallow, 2nd year Roots or Corn, 3rd year Wheat, 4th year Oats, 5th year Summer fallow, 6th year Wheat, 7th year Oats, seeded down with a mixture of Western Rye Grass, Red Clover and Alfalfa, 8th year Hay, 9th year Pasture. Plots, 5½ acres each.

Plot No.	Variety.	Preparation of Soil.	Date Sown.	Date Ripe.	Days Maturing.	Length of Straw including Head.	Strength of Straw.	Length of Head.	Yield per Acre.
									Tons Lbs.
1	Turnips	Fallow	May 22						35 100
	Fodder Corn		" 22						24 1,425
									Bush. Lbs.
2	Red Fife	Hoed crop	April 24	Aug. 30	128	48	10	3	41 37
3	Banner Oats	Wheat stubble	May 10	" 30	112	46	8	8	58 25
4	Fallow	Oat stubble							
5	Red Fife	Fallow	April 24	Sept. 4	133	50	10	3	43 28
6	Banner Oats, S.D.	Wheat stubble	May 10	" 2	115	48	8	8	51 26
7	Hay	Oat stubble							¾ tons.
8	Pasture	Hay							9 cattle 4½ m.
9	Fallow	Pasture							

CULTURAL INVESTIGATION WORK.

An extensive set of experiments to determine the best methods of carrying on the various cultural operations was started last year. A field of twenty-one acres was devoted to the work and some 478 one-fortieth of an acre plots were laid out and permanently marked off, a picket being placed at each corner of each plot. Four-foot interspaces were left between the plots and sixteen-foot roads were arranged between the ranges of plots, with cross roads at convenient places.

The twelve following experiments were started upon this land:

An experiment, occupying 46 plots, to determine the proper depth to plough summer-fallow, stubble and sod to get the most profitable returns in the succeeding crop.

An experiment, occupying 51 plots, to determine the best method of treating a summer-fallow.

An experiment, occupying 39 plots, to determine the best method of preparing stubble land for a succeeding crop.

An experiment, occupying 55 plots, to find out the most satisfactory method of seeding down to grass and clover.

An experiment, occupying 40 plots, to ascertain the best method of breaking sod from cultivated grasses.

An experiment, occupying 108 plots, to determine the best method of applying barnyard manure to secure the best results with corn, wheat, barley and oats.

An experiment, occupying 18 plots, to determine the value of green manuring and the most satisfactory crop to use for that purpose.

An experiment, occupying 9 plots, to determine the importance of seed bed preparation.

An experiment, occupying 75 plots, to determine the relative merits of surface, sub-surface and combination soil packers, and also the best time to use these implements.

An experiment, occupying 12 plots, to determine the best depth to sow wheat and oats.

An experiment, occupying 16 plots, to ascertain the effect of applying commercial fertilizers.

An experiment, occupying 9 plots, to ascertain the effect of under drainage.

These experiments were all gotten under way last spring; the plots being sown with Marquis wheat, Banner oats, Mensury barley, or North-Western Dent corn or else summer-fallowed, as the plan of the experiments required. Throughout the season accurate records were kept of all cultural operations, date of seeding, ripening, cutting, threshing, yield, etc., for each plot. Meteorological records were also kept week by week. Notes were taken on the condition of the soil and weather at the time of seeding, and on all influences affecting germination, growth, development and ripening of the crop, harvesting, etc.

As all the land had received the same treatment the previous season, little difference in the results from the various plots could be expected this year, but it is hoped that in a few years some very valuable information may be gleaned from this work. Growth on the entire field was rank, and most of the wheat was injured by frost, while all of the oat plots were lodged. The wheat gave an average yield of 45 bushels per acre; the oats 114 bushels per acre, and the barley 76 bushels per acre. The corn gave an average yield of nine and one-quarter tons per acre.

In the experiment with soil packers, where some difference in the results from the different plots might have been expected, the dull, damp weather in July and August so retarded ripening that all of the plots were quite immature when the frost came and consequently no definite conclusions could be drawn.

The plots were all prepared in the fall and everything is in readiness to continue the work this spring.

Mr. W. W. Thomson, B.S.A., who was appointed Assistant Superintendent in April, 1911, had charge of the Cultural Investigation work, and carried it on in a most satisfactory and creditable manner.

CLOVER AND GRASS TESTS.

The plots of alfalfa sown in 1904 and 1905 show considerable decrease under plots sown in 1908 and 1909.

The season was very unfavourable for curing the crops, but by putting in small heaps soon after cutting and turning during warm weather, the result was satisfactory.

I repeat remarks in previous report respecting cultivation, seeding, cutting and curing of alfalfa.

CULTIVATION, SEEDING AND HARVESTING OF ALFALFA.

Alfalfa can be sown on fallowed land or on stubble land.

Fallow.—If fallow lands drift with the winds, plough four inches deep before seeding to overcome the danger.

Stubble.—If stubble is heavy burn in the spring, plough five inches deep and harrow. If the land was ploughed the preceding fall, cultivate before sowing.

Seeding.—Sow twelve pounds of seed per acre, from May 25th to 31st. After seeding cross-harrow twice, then roll or pack soil; do not roll fallowed land, use packer instead.

Nurse crop.—On fallowed land grain can be sown; oats or barley is better than wheat, as these can be delayed in seeding. Alfalfa seed should not be sown too early. On stubble land, no nurse crop should be sown, as usually the moisture is not sufficient for both and the tender clover plants die. When clover is up about five inches mow close to the ground, and repeat the first week in August.

Leave the last growth uncut for winter protection. The mowing kills weeds and strengthens the roots, which is important the first winter.

Harvesting.—Alfalfa is usually ready for the first cutting early in July, and for the second cutting the same time in August of the second year. Cut when in blossom. Cut early in the forenoon, and if the day is fine, rake into windrows in the afternoon, and put into small cocks the next day. Allow the hay to cure in the cocks; turning and exposing to the air will hasten drying. Have the hay well dried before stacking, for fear of spoiling.

ALFALFA, SOWN 1904.

Variety.	Remarks.	First cutting July 4.		Second cutting August 18.	
		Tons.	Lbs.	Tons.	Lbs.
Common alfalfa	Strong....	1	740	..	1,120
Turkestan	"	..	1,730	.	1,300

ALFALFA, SOWN 1905.

Variety.	Remarks.	First cutting July 4.		Second cutting August 18.	
		Tons.	Lbs.	Tons.	Lbs.
Grimm	Strong....	1	1,880	1	280
New York	"	1	1,920	..	1,580
Samarkand (Turkestan)	"	1	940	..	1,620
Nebraska	"	1	620	..	1,020

ALFALFA, SOWN 1908.

Variety.	Remarks.	First cutting July 3.		Second cutting August 19.	
		Tons.	Lbs.	Tons.	Lbs.
Grimm (Lyman Co.)	Strong....	1	1,690	1	205
Idaho	"	2	410	1	745
Montana (Lyman Co.)	"	2	230	1	835
Dryland (Lyman Co.)	"	2	230	1	700
French alfalfa	"	2	680	1	1,240
Turkestan (Lyman Co.)	"	2	560	1	1,060

ALFALFA, SOWN 1910.

Variety.	Remarks.	First cutting July 8.		Second cutting August 18.	
		Tons.	Lbs.	Tons.	Lbs.
Grimm	Strong	1	1,970	..	1,920
Turkestan	"	1	980	..	1,680

ALFALFA, SOWN 1909.

Variety.	Remarks.	First cutting. July 3rd.		Second cutting. August 19th.	
		Tons.	Lbs.	Tons.	Lbs.
Canadian	Strong	4	721	1	907
Vilmorin's Sand Lucern	"	3	616	2	267
Lecoq's	"	4	332	1	1,879
Mongolian	"	3	616	1	907
Nephi Utah (dry land)	"	3	202	1	1,879
Sextorp, Neb	"	3	202	1	907
Alt-Deutsche Frankische	Medium	1	1,296	1	907
Provence-Aubignan	Strong	3	202	2	845
Wessel, Duval Peruvian	Medium	1	907	1	907
Baltic	Strong	3	1,004	2	1,233
Werney, Turkestan	Medium	1	1,296	2	1,233
Sand Lucerne (Darmstadt)	Strong	2	1,233	2	1,814
Chinook, Montana	"	3	202	1	1,296
Liefman's Sand Lucerne	"	2	651	2	845
Arabian	Killed out	..	....	..	....
Medicago, ruthenica	"	..	....	..	....
Medicago, falcata	Strong	4	720	made no growth.	
Sand Lucerne, Bromberg	"	3	422	2	651
Thuringian Erfurt	"	2	1,814	2	651
Sand Lucerne, Wissinger	Medium	1	1,879	2	73
Hungarian, Boschan	Strong	2	845	1	1,879
Pfalzer (Bavarian)	"	2	1,819	3	202
Frasinet (Roumanian)	"	2	1,814	2	1,233
Vasluiu	"	3	422	2	1,233
Belfontaine (Ohio)	"	3	616	2	845
Mixed seed	"	2	1,427	3	202
Old Frankish Lucerne	"	2	1,330	1	1,308
W. A. Wheeler, No. 162	"	1	1,240	1	205
No. 240	"	1	1,735	1	565
No. 164	"	1	1,060	1	115
No. 167	"	1	1,780	1	250
Grimm (A. B. Lyman Co.)	"	1	1,690	..	1,935
Montana (23454)	"	1	340	..	1,998
No. 25102	"	1	1,240	1	205
Sand Lucerne (23394)	"	1	430	1	295
Canadian, Variegated	"	1	1,240	1	322
" Purple flowers	"	1	790	1	43
Turkestan	"	1	880	1	160
Turkestan (sown 1910)	"	1	1,420	.	1,503
Grimm	"	1	700	1	25
Turkestan	Kept for seed none matured				

GRASSES AND RED CLOVER.

Variety.	Year Sown.	First cutting July 4th		Second cutting August 18th.	
		Tons.	Lbs.	Tons.	Lbs.
Rye Grass, Red Clover and Timothy	1907	1	880	..	960
Brome Grass	1899	1	1,320	..	1,340
Western Rye Grass and Red Clover	1904	1	340	..	704
Red Top	1908	1	1,480	..	1,610
English Blue Grass	1908	1	440	..	1,200
Red Clover	1910	2	460	.....	

CORN AND ROOT CROPS.

The land for these crops was summer-fallowed the previous year, being ploughed early in June about eight inches deep.

During the growing season it was cultivated several times, and before frost set in manure was applied and ploughed in. In the spring a cultivation was given before the corn and roots were sown.

EXPERIMENTS WITH INDIAN CORN.

Nine varieties of Indian corn were sown on May 22 in rows 35 inches apart, an ordinary hoe grain drill being used.

Frost overtook the crop before the ears were well formed and it was cut and put in the silo, from the 12th to the 17th of September.

The land was summer-fallowed in 1910 and 12 tons of well rotted manure applied in November and ploughed in.

INDIAN CORN FOR ENSILAGE—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when Cut.	Weight per acre grown in Rows.	
				Ins.		Tons.	Lbs.
1	Angel of Midnignt	May 22.	Sept. 12	90	Early milk	26	580
2	Champion WhitePearl	" 22.	" 12	94	"	17	1,200
3	Compton's Early	" 22.	" 12	85	Silk	25	1,260
4	Patterson	" 22.	" 12	62	Late milk	17	1,310
5	Eureka	" 22.	" 12	84	Early milk	20	1,250
6	Longfellow	" 22.	" 12	102	"	24	400
7	North-Western Dent	" 22.	" 12	72	"	18	300
8	Selected Leaming	" 22.	" 12	78	"	18	1,840
9	Superior Fodder	" 22.	" 12	81	In tassel	19	60

FIELD ROOTS.

Turnips, mangels, sugar beets and carrots were sown on fallowed land. Frequent cultivation was given during the season and the crop was very satisfactory both in yield and quality.

Turnips—Test of Varieties.

Name of Variety.	Character of Soil.	Size of Plot.	Character of Growth.	1st plot—Sown.	1st Plot—Pulled.	Yield per Acre. 1st Plot. Tons.	Yield per Acre. 1st Plot. Lbs.	Yield per Acre. 1st Plot. Bush.	Yield per Acre. 1st Plot. Lbs.	Description of Variety.
Hall's Westbury.....	Clay loam	1/132	Strong.	May, 22	Oct. 7	39	1,068	1,317	48	Large, very fine.
Jumbo.....	" "	1/132	"	" 22	" 7	39	672	1,311	12	" "
Magnum Bonum.....	" "	1/132	"	" 22	" 7	35	1,676	1,194	36	" good.
Mammoth Clyde.....	" "	1/132	"	" 22	" 7	35	1,544	1,192	24	" "
Perfection Swede.....	" "	1/132	"	" 22	" 7	35	1,412	1,190	12	" "
Hartley's Bronze.....	" "	1/132	"	" 22	" 7	33	1,716	1,128	36	" "
Good Luck.....	" "	1/132	"	" 22	" 7	33	1,716	1,128	36	Medium "
Halewood's Bronze Top....	" "	1/132	"	" 22	" 7	32	152	1,069	12	" "
Carter's Elephant.....	" "	1/132	"	" 22	" 7	27	1,868	931	8	" "
Bangholm Selected.....	" "	1/132	"	" 22	" 7	26	1,196	886	36	" "

Mangels—Test of Varieties.

Name of Variety.	Character of soil.	Size of plot.	Character of growth.	1st plot—Sown.	1st plot—Pulled.	Yield per Acre. 1st Plot. Tons.	Yield per Acre. 1st Plot. Lbs.	Yield per Acre. 1st Plot. Bush.	Yield per Acre. 1st Plot. Lbs.	Description of Variety.
Selected Yellow Globe....	Clay loam	1/132	Strong.	May, 22	Oct. 6	34	1,696	1,161	36	Large and smooth
Half Sugar White.....	" "	1/132	"	" 22	" 6	34	144	1,135	12	" "
Yellow Intermediate.....	" "	1/132	"	" 22	" 6	31	1,360	1,056	..	" "
Perfection Mam. Long Red	" "	1/132	"	" 22	" 6	30	1,996	1,051	36	" "
Giant Yellow Globe.....	" "	1/132	"	" 22	" 6	30	1,908	1,031	48	" very fine.
Prize, Mam. Long Red....	" "	1/132	"	" 22	" 6	30	588	1,009	48	Medium size, rooty.
Giant Yellow Intermediate	" "	1/132	"	" 22	" 6	29	202	970	12	Medium size, smooth.
Gate Post.....	" "	1/132	"	" 22	" 1	26	1,988	899	48	Small size very rooty.

Sugar Beets—Test of Varieties.

French Very Rich.....	Clay loam	1/132	Strong.	May, 30	Oct. 7	21	1,956	732	36	Good size smooth.
Klein Wanzleben.....	" "	1/132	"	" 30	" 7	14	248	470	48	Medium size, smooth.
Vilmorin's Improved.....	" "	1/132	"	" 10	" 7	11	1,232	387	12	Small, rooty.

Carrots—Test of Varieties.

Ontario Champion.....	Clay loam	1/132	Strong.	May, 22	Oct. 7	22	616	743	30	Large, smooth.
Improved Short White....	" "	1/132	"	" 22	" 7	21	636	7..	36	" "
Mam. White Intermediate.	" "	1/132	"	" 22	" 7	20	524	607	32	" "
White Belgian	" "	1/132	"	" 22	" 7	17	1 112	585	12	Medium, "
Half Long Chantenay.....	" "	1/132	"	" 22	" 7	16	1,528	558	48	" "

EXPERIMENTS WITH POTATOES.

Seventeen varieties of potatoes were planted on the 18th of May in drills thirty inches apart, and twelve to fourteen inches apart in the drills. After the crop was up the ground was harrowed and frequent cultivation given during the season.

The potatoes were taken up on the 29th and 30th of September and were without exception the best ever grown on the Experimental Farm.

American Wonder, which is usually near the top of the list in yield, was this year the second lowest, caused by being rather close to trees.

POTATOES—Test of Varieties.

No.	Variety.	Character of Soil.	Date Planted.	Date Lifted.	Growth.	Size.	Yield per Acre.		Form and Colour.
							Bush.	Lbs.	
1	American Wonder..	Clay Loam	May, 18	Sept, 29	Medium.	Large.	367	24	Long, White.
2	Ashleaf Kidney.....	" "	" 18	" 29	Strong.	"	694	40	Round, White.
3	Late Puritan.....	" "	" 18	" 29	"	"	772	12	Oval, White.
4	Carman No. 1.....	" "	" 18	" 29	"	"	640	12	" "
5	Empire State.....	" "	" 18	" 29	"	"	697	24	Round, White.
6	Vicks Extra Early..	" "	" 18	" 29	"	"	690	48	Oval, Pink.
7	Dalmeny Beauty....	" "	" 18	" 29	"	"	655	36	" White.
8	Morgan Seedling...	" "	" 18	" 29	"	"	719	24	Long, Pink.
9	Money Maker	" "	" 18	" 29	"	"	567	36	Long, White.
10	Reeves' Rose.....	" "	" 18	" 29	"	"	574	12	Oval, Red.
11	Rochester Rose.....	" "	" 18	" 29	"	"	761	12	" "
12	Everett.....	" "	" 18	" 29	"	"	732	12	Long, Pink.
13	Factor.....	" "	" 18	" 29	"	"	521	24	Oval, White.
14	Gold Coin.....	" "	" 18	" 29	"	"	810	..	" "
15	Irish Cobbler..	" "	" 18	" 29	"	"	809	45	Long, Pink.
16	Dreer's Standard....	" "	" 18	" 29	"	"	717	12	Oval, White.
17	Hard to Beat.....	" "	" 18	" 29	"	"	314	36	" "

VEGETABLE TESTS.

Excepting vegetables such as cabbage, cauliflower, beets, celery, carrots and onions, the season was not favourable, and the results were not satisfactory.

The weather was cold and wet when tomatoes, cucumbers, squash, melons, etc., were in blossom, causing very little fruit to set.

Frost in August overtook peas, beans, corn, etc., before they had ripened.

Asparagus.—A good crop was obtained from the old beds of Barr's Mammoth, Barr's Elmira and Conover's Colossal. In use from May 13 to July 10.

Beans.—Sown in garden May 18, destroyed by frost before maturing.

Variety.	Seed from.	In Use.	Pulled.	Remarks.
Kenney's Rustless Wax	Thorburn.	July 26	Sept. 8	Frozen.
Wardell's Kidney Wax	"	" 29	" 8	"
Valentine	"	" 29	" 8	"
Early Refugee	"	" 24	" 8	"
Challenge Black Wax	"	" 26	" 8	"
Stringless Green Pod	Burpee.	" 26	" 8	"
Refugee or Thousand to One	Henderson.	Aug. 20	" 8	"
Hodson Wax	Ont. Seed Co.	" 15	" 8	"
Davis White Wax	"	July 29	" 8	"
Flageolet or Giant Wax	"	" 26	" 8	"
Wardell's Kidney Wax	"	" 26	" 8	"
Red Valentine	"	" 26	" 8	"
Refugee or Thousand to One	"	Aug. 18	" 8	"

Beets.—Sown May 3, pulled September 28.

Variety	In use.		Yield per Acre.	
			Bush.	Lbs.
Meteor	July	28	1,060	..
Ruby Dulcet	"	28	773	20
Black Red Ball	Aug.	1	406	..
Early Blood Red Turnip	"	1	773	20
Egyptian Dark Red Turnip	"	4	812	..
Eclipse	July	26	541	20
Egyptian Dark Red	"	26	522	..

Cabbage.—Sown in hot-house March 23, set out in garden May 18, taken up September 28.

Variety.	In Use.		Average Weight.	Remarks.
			Lbs.	
Lubeck	July	28	10	Medium, solid.
Madgeburg	Aug.	24	12	Large "
Small Erfurt	"	1	10	Medium "
Winningstadt	"	24	10	" "
Danish Ball Head	"	28	13	Large "
Extra Dark Red Dutch (red)	Sept.	25	4	Small "
Danish Delicatesse (red)	"	25	4	" "
Red Danish Stone Head (red)	"	25	3	" "
Danish Summer Baldhead	Aug.	24	8	Medium "
Flat Swedish	July	29	20	Extra large, solid.
Improved Amager Danish Roundhead	Aug.	24	8	Small "
Extra Amager Danish Ballhead	"	27	12	Large "
Copenhagen Market	July	29	19	Extra large, solid.

Cabbage.—Sown in hot-house March 29, set out in garden May 23, taken up September 28.

Variety.	In Use.		Average Weight.	Remarks.
			Lbs.	
Early Jersey Wakefield	July	29	10	Medium, solid.
Early Paris Market	"	29	9	Small "
Fottler's Improved Drumhead	"	30	10	Medium "
Large Flat Drumhead	Aug.	24	11	" "
Extra Early Midsummer Savoy	"	1	11	" "

Cauliflower.—Sown in hot-house March 23, set out in garden May 18.

Variety.	In use.		Average Weight.	Remarks.
Danish Giant	July	29	8 lbs.	Good.
Early Snowball	"	10	7 "	"
Extra Early Selected Erfurt Dwarf	"	15	6¼ "	"

Celery.—Planted June 10 in trenches 18 inches deep, 9 inches of manure in bottom of trench and 6 inches of soil on top of the manure. The celery was given several good waterings during the season.

Variety.	Sown in Hot-house.	Set out.	In use.	Weight per dozen Heads.
Paris Golden Yellow	Mar. 29	June 10	Oct. 10	25 lbs.
Giant Pascal	" 29	" 10	" 10	20 "
Rose Ribbed	" 29	" 10	" 10	24 "
French Success	" 23	" 10	Sept. 25	28 "
Nollts' Magnificent	" 23	" 10	" 25	26 "
Evans' Triumph	" 23	" 10	" 25	29 "
White Plume	" 27	" 10	" 11	14 "

Carrots.—Sown April 26, pulled September 28.

Variety.	In use.	Yield per Acre.		Remarks.
		Bush.	Lbs.	
French Horn	July 21	464	..	Good crop.
Improved Nantes	" 21	290	..	Medium crop.
Oxheart	" 21	425	20	Good crop.
Chantenay	" 21	251	20	Medium crop.

Cucumbers.—Sown in hot-house March 23, set out in garden May 31.

Variety.	In Use.	Ripe.	Length.	Remarks.
			In.	
Chicago Pickling	Aug. 16		6	Poor crop.
Improved White Spine				None.
Early Short Green	Aug. 16		5	Poor crop.
Peerless, or Improved, White Spine				None.

Egg Plant.—Sown in hot-house March 23, set out in garden June 6, some fruit formed but did not mature.

TABLE CORN—Sown May 20.

Variety.	In Use Green.	Remarks.
Malakoff	Aug. 29	Did not mature for seed.
Fordhook Early	" 29	" "
Golden Bantam	Sept. 14	" "
Early Evergreen	" 9	" "
Henderson's Metropolitan	" 9	" "
Devitt's Early Sugar	" 9	" "
White Squaw	Aug. 20	" "

Citrons.—Sown in hot-house April 6, set out in garden June 1, no fruit matured.

Musk Melon.—Sown in hot-house March 23, planted out in garden May 31, none matured.

Parsnips.—Sown in garden April 26, taken up October 20.

Variety.	In Use.	Bushels per Acre.	Remarks.
Hollow Crown	Sept. 13	696	Good crop.

Parsley.—Double curled, sown in hot-house March 23, transplanted in garden May 19, in use July 19, good crop.

Peppers.—Three varieties, Cayenne, Chili and Early Metropolitan were sown in hot-house March 23, transplanted in garden June 1; did not mature.

GARDEN PEAS—Sown in garden May 3.

Variety.	In Use.	Pulled.	Remarks.
Gregory's Surprise	July 28	Aug. 24	Poor crop.
Gradus	" 30	Sept. 6	Medium crop.
American Wonder.	" 25	" 2	" "
McLean's Advancer	" 28	" 27	" "
Heroine	" 30	" 27	" "
Stratagem	Aug. 4	" 6	" "
Telephone	" 10	" 25	" "
Thos. Laxton	" 4	" 2	" "
Premium Gem	July 28	Aug. 10	Poor crop.
Nott's Perfection	Aug. 10	Sept. 27	Medium crop.
Sutton's Excelsior	" 10	Oct. 4	" "
Juno	" 20	" 4	" "

Only two varieties, Gregory's Surprise and Premium Gem matured, the others were injured by frost.

Radish.—First seeding in garden, April 27, second seeding June 6, first seeding in use May 9, second seeding in use July 4.

Variety.	Remarks, First Seeding.	Remarks, Second Seeding.
Forcing Turnip Scarlet	Good crop.	Good crop.
Early Scarlet White Tipped	" "	" "
Non Plus Ultra	" "	" "
Rosy Gem	" "	" "
White Scribe	" "	" "

Lettuce.—First seeding April 27, second seeding June 6, first seeding in use June 2, second seeding in use August 4.

Variety.	Remarks, First Seeding.	Remarks, Second Seeding.
Red Edged Victoria	Good heads.	Good heads.
Unrivalled Summer	" "	" "
Wheeler's Tom Thumb	" "	" "
Cos Trianon	" "	" "
All Heart	Med. heads.	Fair size.
Grand Rapids	Good heads.	Good heads.
Giant Crystal Head	" "	" "
Black Seeded Simpson	" "	" "
Crisp as Ice	Extra large.	" "
Iceberg	" "	" "
Hanson	Good heads.	" "
May King	" "	" "

ONIONS—Sown in garden April 26, taken up September 25.

Variety.	Bushels Per Acre.		Remarks.
Large Red Wethersfield	309	20	Good crop.
Southport Red Globe	309	20	"
Yellow Globe Danvers	290	..	"
Johnson's Dark Red Beauty	192	20	Medium crop.
Danver's Yellow Globe	188	31	"
Salzer's Wethersfield	145	6	"

SQUASH.

Variety.	Sown in Hothouse.	Set out in Garden.	In use.	Pulled.	Remarks.
Summer Crookneck	March 23.	May 31			Did not mature.
Delicata	" 23.	June 1			" "
Custard Marrow Scallop	" 29.	" 1			" "
Long White Bush Marrow	" 29.	May 31	August 1	Sept. 6	Poor crop.
Long Vegetable Marrow	" 29.	" 31	" 10	" 6	"
White Congo	" 29.	June 1			Not matured.
Mammoth Whale	" 29.	May 31	Sept. 1		Poor crop.
Hubbard	" 29.	" 31			Not matured.

Tomatoes.—Sown in hot-house April 4, set out in garden May 31.

Variety.	First Ripe.	Weight from 5 Plants.	Remarks.
		Lbs.	
Chalk's Early Jewel	August 10	9¼	Poor crop.
Bonny Best	" 31	14¼	"
Rennie's XXX	" 27	10	"
Florida Special	" 27	9¾	"
Earliana	" 24	10½	"
First of All	" 27	6¼	"
Spark's Earliana	" 24	18	"

Water Melons.—Planted in hot-house March 23. Planted out in garden May 31. No fruit formed as fertilization was prevented by the dull, cold weather.

Musk Melons.—Sown in hot-house March 23. Set out in garden May 31. The growth was poor and no fruit formed.

Citron.—Sown in hot-house April 6. Planted in garden June 1. Growth was very small and no fruit formed.

Turnips.—Early White Flat Strapped, sown in garden May 19, ready for use July 28, taken up October 13. Yield per acre, 1,450 bushels.

Brussels Sprouts.—Sown in hot-house April 3. Planted in garden May 17. pulled October 20. Average weight per head 9 lbs.

Salsify.—Sown in garden May 19. Ready for use September 20, pulled October 13. Good crop. Variety, Long White.

Spinach.—Sown in garden May 19. Ready for use July 4. Good crop. Second seeding, June 6. Ready for use July 28. Good crop.

Rhubarb.—The old beds of rhubarb were in use from May 16 to September 23, giving a good crop.

Rhubarb seed was sown on June 11, to produce young plants for the following spring's distribution.



Part of the Shrubbery, Experimental Farm, Indian Head, Sask.

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THE FLOWER GARDEN.

Both annual and perennial flowers gave a large quantity of bloom, the most interesting being a bed of pansies and a bed of sixteen varieties of hollyhocks.

Annuals:

Variety.	Sown in Hot-house.	Trans-planted.	In Bloom.	
			From.	To.
Asters (13 varieties)	April 4	May 29	July 7	Aug. 11.
Abronia umbellata	...	" 15	Aug. 2	Sept. 24.
Ageratum, Dwarf Imperial	...	" 15	" 1	" 28.
Antirrhinum, (6 varieties)	April 28	June 5	July 7	" 28.
Balsam, Camellia	" 4	May 30	June 28	Aug. 26.
Brachycome iberidifolia	...	" 15	Aug 3	Sept. 24.
Calendula	...	" 18	June 27	Oct. 25.
Candytuft	March 28	June 2	" 20	Sept. 29.
Clarkia	...	May 15	July 4	" 24.
Celosia	...	" 18	Aug. 11	Aug. 25.
Coreopsis picta	...	" 18	July 28	Sept. 24.
Dianthus, (7 varieties)	...	" 15	" 4	Oct. 20.
Eschscholtzia Californica	...	...	June 28	Sept. 6.
Gaillardia. (picta)	...	May 15	July 20	" 28.
Godetia rubicunda	...	" 15	Aug. 10	Oct. 20.
Helichrysum	...	" 15	" 10	Sept. 24.
Iberis	...	" 15	July 7	" 28.
Larkspur, (3 varieties)	March 24	April 19	" 4	Oct. 20.
Mignonette	...	May 15	" 4	" 20.
Nicotiana affinis	...	" 15	" 5	Sept. 24.
Nemesia	...	" 15	" 4	" 24.
Papaver Danebrog	March 24	April 29	No bloom	
Pansy. (8 varieties)	" 24	" 19	June 18	Oct. 23.
Petunia	" 24	May 30	" 18	Sept. 24.
Phlox, (4 varieties)	" 28	April 19	July 15	Oct. 27.
Poppy. (4 varieties)	...	May 15	Aug. 1	Sept. 9.
Portulaca	...	" 15	July 10	" 6.
Salpiglossis	...	" 15	Aug. 16	" 28.
Scabiosa, (3 varieties)	...	" 15	July 25	Oct. 20.
Sultan Sweet	...	" 15	" 11	Sept., 24.
Stocks, (2 varieties)	April 3	" 30	June 20	Oct. 4.
Tagetes patula	...	" 15	No bloom.	
Sweet Peas (24 varieties)	...	April 27	July 15	" 6.
Nasturtium (4 varieties)	April 27	May 30	" 4	Sept. 6.
Verbenas (3 varieties)	" 4	" 30	No bloom	
Zinnia	" 4	" 30	June 28	Aug. 26.
Lobelia	...	April 6	July 7	Sept. 28.

Hollyhocks—(Biennials.)

Sixteen varieties of hollyhock were sown in the hot-house on March 25, and transplanted in the garden June 1, 1910. These bloomed this season from July 18 to October 4.

PERENNIALS.

Variety.	In Bloom.	
	From	To
Achillea Millefolium	June 19	Sept. 15.
Achillea Ptarmica	" 19	" 20.
Blue Squills	May 5	May 15.
Bleeding Heart	June 17	July 12.
Columbine	" 2	" 22.
Comfrey	" 17	" 25.
Clematis, Blue	" 30	Sept. 20.
Clematis, recta	" 19	Aug. 17.
Campanula	July 17	Sept. 24.
Centaurea, Yellow	Aug. 4	" 20.
Centaurea	July 28	" 10.
Everlasting	June 20	June 30.
German Iris	May 29	" 17.
Golden Glow	Aug. 24	Sept. 21.
Gladioli	July 18	" 20.
Helianthus	" 22	" 2.
Hemerocallis	" 17	Oct. 7.
Iris Sibirica	May 29	June 20.
Japanese Paeonies	June 19	July 25.
Larkspur	July 8	Aug. 4.
Lilies (several varieties)	June 24	" 17.
Lupinus Polyphyllus	" 19	July 25.
Lily of the Valley	No bloom.	
Oriental Poppy	June 20	" 4.
Paeonies (assorted varieties)	May 26	" 25.
Phlox (perennial)	July 23	Sept. 25.
Pyrethrum	June 20	Aug. 10.
Perennial Asters	No bloom.	
Sweet William	June 14	July 29.
Sidalcea, candida	July 18	Aug. 15.
Spiraea, Filipendula	June 24	July 24.
Shasta Daisy	July 4	Sept. 14.
African Daisy	" 4	" 25.
Tall Lychnis	June 10	Aug. 3.
Tall White Iris	" 8	June 24.
Veronica Spicata	" 19	Sept. 22.
Canterbury Bells	July 10	" 5.
Tulips (18 varieties)	May 6	June 10.
Dahlias (33 varieties)	No bloom.	
Cannas (13 varieties)	Aug. 23	Sept. 26.

FRUITS.

While all fruit trees and bushes were loaded down with blossoms, a cold, wet spell, with hail at time of bloom caused the fruit crop to be disappointing. This was especially the case with crab apples, plums and currants.

Twenty-six varieties of red currants, twelve varieties of white, and thirty-one of black are at present under test, also thirty varieties of gooseberries, fifteen of raspberries and blackberries, with one variety of strawberries.

SMALL FRUITS.

The following varieties of small fruits are grown on the Farm at present:

Red Currants.

Benwell,
Cherry,
Cumberland Red,
Early Scarlet,
Fay's Prolific,
Fertile D'Angers,
Greeenfield,
Houghton Castle,
London Red,
Large Red,
La Conde,
Long Bunch Holland,
Manitoba Amber,
Moore's Early,
North Star,
New Red Dutch,
Prince Albert,
Red Grape,
Raby Castle,
Rankins' Red,
Red Jacket,
Simcoe King,
Victoria,
Victoria Red,
Versailles.

White Currants.

Climax,
Frauendorfer White,
Large White,
Large White Brandenburg,
Verrieres' White,
White Imperial,
White Dutch,
White Kaiser,
White Cherry,
White Pearl,
White Grape,
Wentworth Leviathan.

Black Currants.

Bang-Up,
Black English,
Beauty,
Black Grape,
Crandall's Missouri,
Clipper,
Climax,
Dominion,
Eclipse,
Ethel,
Eagle,
Gewohnliche,
Ismay's Prolific,
Kerry,
Lewis,
Lee's Prolific,
Mattie,
Merveille de la Gironde,
Magnus,
Ogden,
Ontario,
Oxford,
Perry,
Perth,
Stirling,
Stewart,
Star,
Standard,
Saunders,
Topsy,
Winona.

Raspberries.

Columbia,
Cuthbert,
Cardinal,
Dr. Reider,
Golden Queen,
Herbert,
King,
Marlboro,
Ruby Red,
Turner.

Black Raspberries.

Conrath,
Hilborn,
Mungers,
Older,
Palmer.

Gooseberries.

Companion,
Cluster,
Carrie,
Carman,
Cox's Late Green,
Downing,
Edna,
Governess,
Gibb,
Griffin,
Houghton's Seedling,
Industry,
Lady Houghton,
Mabel.
Merton,
Pale Red,
Ruth,
Rideau.
Red Jacket,
Ramsay,
Richland.
Smith's Improved,
Saunders,
Sussex,
Sandow,
Silvia,
Troy,
Vesta,
Weir,
York.

Strawberries.

Senator Dunlap.

Cross-Bred Apples.

When picking the crop of cross-bred apples, a record was kept of the weight of fruit gathered from some of the best trees, and is given below. The date of picking was September 22.

Orchard	Row.	No.	Name.	Year Planted.	Year Began Fruiting.	Weight of Fruit, 1911. Lbs.	Average Diameter.
IV	3	404	Cavan	1901	1904	44	1¼
IV	3	405	Cavan	1901	1904	32	1¼
IV	4	428	Aurora	1903	1907	45	1
IV	4	429	Aurora	1903	1907	49	1
IV	4	430	Aurora	1903	1907	37	1
IV	4	431	Aurora	1903	1907	31	1
IV	5	436	Charles	1903	1909	29	1⅛
IV	5	437	Charles	1903	1907	26	1½
IV	5	438	Charles	1903	1908	20	1½
IV	5	439	Charles	1903	1907	18	1½
IV	5	445	Derby	1903	1907	29	1
IV	5	451	Pioneer	1903	1907	27	1
IV	6	457	Progress	1903	1908	24	1
V	4	583	Prairie Gem	1904	1908	26	1¼
V	13	695	Sdlg. of Stork	1905	1908	10	1
VI	1	875	Northern Queen	1905	1908	12½	¾
VI	2	893	Pioneer	1905	1909	15	1
VI	3	904	Tony	1905	1908	38	1⅛
VI	3	911	Eve	1905	1909	8	1¼
III	1	228	Novelty	1902	1907	11	1
III	3	268	Prairie Gem	1902	1907	19	1
III	5	286	Aurora	1902	1905	38	1
III	6	306	Aurora	1902	1908	34	1

Seedling Plums.

Seventeen varieties of seedling plums, obtained from the Experimental Station at Brookings, S. Dakota, in 1908, came through the winter safely. Several of the varieties fruited to a small extent, producing some large-sized plums that ripened before frost came.

FRUIT TREES PLANTED IN 1911.

HYBRID APPLES OBTAINED FROM HELDERLEIGH NURSERIES, WINONA, ONT.

50 Alberta.
15 Magnus.
50 Silvia.
50 Jewel.
25 Pioneer.
25 Tony.

OBTAINED FROM THE PLEASANT VALLEY NURSERIES, WINONA, MINN., U.S.A.

10 Duchess.
10 Charlamoff.
10 Hibernal.
10 Patten's Greening.

TREES AND SHRUBS.

All varieties made a good growth, and unlike the previous year, frost did no harm in the spring, and all had a great deal of bloom. A list of the shrubs in bloom is given. The lilacs, 20 varieties, and mountain ash were conspicuous for their great profusion of flowers.

FLOWERING SHRUBS.

Variety.	In Bloom.	
	From.	To
Lilacs.		
Mons. Maxime Cornu	June, 6	July, 8.
Rubella Plena	" 6	" 12.
Condorcet	" 10	" 16.
La Tour d'Auvergne	" 6	" 10.
Mathieu de Dombasle	" 9	" 8.
De Marly	" 8	" 10.
President Grevy	" 6	" 8.
Lemoine	" 10	" 16.
Persian Lilac	" 13	" 4.
Madame Casimir Perrier	" 7	" 12.
Chas. Joly	" 6	" 5.
Francisque Morel	" 9	" 10.
Congo	" 7	" 10.
Mme. Legraye	" 8	" 12.
Abel Carrière	" 8	" 7.
Madame Lemoine	" 6	" 6.
Josikaea	" 12	" 18.
Charles X	" 8	" 9.
Michel Buchner	" 6	" 6.
Villosa	" 15	" 27.
Other varieties of shrubs.		
Golden Currant	" 9	" 21.
American Elder	" 10	" 19.
Saskatoon	May, 5	May, 13.
Hawthorn	" 12	" 19.
Caragana (6 varieties)	" 25	June, 12.
Dogwood (Cerus)	" 25	" 17.
High Bush Cranberry	June, 14	" 30.
Berberis	" 30	" 15.
Roses (single varieties)	" 4	Oct. 12.
Mountain Ash	" 5	" 14.

PREPARING LAND FOR GRAIN-CROPS IN SASKATCHEWAN.

By Angus Mackay,

Superintendent of Experimental Farm, Indian Head, Sask.

During the growing season of 1908 almost the entire western portion of the province suffered from dry weather, and the majority of the new settlers, either from unfamiliarity with the methods of cultivation for the conservation of moisture, or through a desire to bring the greatest possible area under cultivation, naturally suffered a severe disappointment.

In some districts, where in former years moisture had been abundant and proper cultivation had in consequence been neglected in the effort to 'get rich quick,' the partial failure of the crop proved an expensive lesson.

For many years, commencing in 1888, the methods of conserving moisture by 'Breaking and Backsetting' and by 'Summer-fallowing,' now called 'Dry-farming' for a change, have been recommended and universally adopted by the older settlers, but to very many of the new settlers they are unknown. The latter, I trust, may be benefited by the following explanation of the methods, which, for a great many years, have proven uniformly successful at the Experimental Farm here, and may with confidence be recommended for every district in the Province of Saskatchewan.

BREAKING PRAIRIE SOD.

The success or failure of a new settler often depends on the method employed in the preparation of the land for his first crop, and it is therefore of the utmost importance that the question of 'Breaking' or 'Breaking and Backsetting' be given the consideration it deserves.

For some years past the general practice throughout the country has been to continue breaking three or more inches deep so long as the teams can turn over the sod, then in the fall to disc the top-soil and grow grain in the spring following. From the breaking so done before the end of June, a good crop of wheat, oats or barley is usually obtained but no amount of cultivation will ensure even a fair crop on this land in the next succeeding year. After the first crop has been cut, the soil is usually in a perfectly dry state and remains so, in spite of any known method of cultivation, until the rains come in the spring following. If they are insufficient or late, as is frequently the case, failure of the crop must be the result.

BREAKING AND BACKSETTING.

Breaking and backsetting is the true way of laying the foundation for future success in the greater number of districts throughout the province, and while this method does not permit of as large an acreage being brought under cultivation in the year, it does permit of more thorough work and ensures better results in the long run. The anxiety of nearly all settlers to sow every acre possible, regardless of how or when the work on the land has been accomplished, may be given as the reason for breaking and discing, to a large extent, superseding the older, better and safer plan.

Breaking and backsetting means the ploughing of the prairie sod as shallow as possible before the June or early July rains are over, and in August or September, when the soil will have become thoroughly rotted by the rains and hot sun, ploughing two or three inches deeper in the same direction and then harrowing to make a fine and firm seed bed. From land prepared in this way two good crops of wheat may be expected. The first crop will be heavy and the stubble, if cut high at harvest time, will retain sufficient snow to produce the moisture required, even in the driest spring, to germinate the seed for the next crop. The stubble-land can readily be burned on a day in the spring with a warm, steady wind and the seed may be sown with or with-

out further cultivation. In a case where the grass roots have not been entirely killed by the backsetting, a shallow cultivation before seeding will be found advantageous but as a rule the harrowing of the land with a drag-harrow after seeding will be sufficient.

The principal objection to 'breaking and backsetting is urged with regard to the backsetting which, no doubt, is heavy work for the teams, but if the discing required to reduce deep-breaking and then the ploughing or other cultivation that must be done in an effort to obtain a second crop, be taken into consideration it must be conceded that in the end 'breaking and backsetting' is the cheaper and better method.

When two crops have been taken from new land it should be summer-fallowed.

SUMMER-FALLOWS AND SUMMER-FALLOWING.

Among the many advantages to the credit of the practice of summer-fallowing may be mentioned:—The conservation of moisture, the eradication of weeds, the preparation of the land for grain-crops at a time when no other work is pressing, the availability of summer-fallowed land for seeding at the earliest possible date in the spring and the minor advantages of having suitable land for the growing of pure seed, potatoes, roots and vegetables at the least cost and with the greatest chance for success, and that of being able to secure two crops of grain with little or no further cultivation.

Summer-fallowing undoubtedly has some disadvantages, but so long as the growing of grain, and more particularly wheat, remains the principal industry of the province, it will be necessary to store up moisture against a possible dry season, to restrain the weeds from over-running the land and on account of the short seasons, to prepare at least a portion of the land to be cropped in the year previous to seeding and a well-made summer-fallow is the best means to this end. Among the disadvantages are:—The liability of the soil to drift, the over-production of straw in a wet season, causing late maturity and consequent danger of damage by frost, and it is claimed, the partial exhaustion of the soil. The two former may, to a great extent, be overcome by different methods of cultivation, and if the soil can be prevented from drifting, I am satisfied that one of the reasons for the latter contention will disappear.

Various methods are practised in the preparation of fallow and where the aim has been to take advantage of the June and July rains and to prevent the growth of weeds, success is almost assured. Where the object has been to spend as little time as possible on the work, failure is equally certain.

In my annual report for the year 1889, the following was submitted for the consideration of the settlers. Since then many experiments have been conducted on the Experimental Farm with different systems and again I submit what, on the whole, have been found to be the most successful methods for the cultivation of the soil in Saskatchewan:—

FROM REPORT OF 1889.

December 29.

'The year just past has been one of extremes. Last winter was one of the mildest on record and March was so very fine that thousands of acres of grain were seeded from the 15th to the 31st, and at no time in the history of the country has the ground been in better condition for the reception of the seed. Immediately after seeding, however, exceptionally high winds set in, followed by extreme drought during the entire growing season. In many places the crops were injured by the winds and finally almost ruined by the succeeding dry weather. In some localities, however, where the farming had been done in accordance with the requirements of the country the crops did fairly, and considering the excessively dry weather, remarkably well.

'The Experimental Farm suffered in company with every other farm in the country. Perhaps very few suffered as much from winds, but the dry weather, though reducing the yields, did not prove so disastrous as to many others. In this portion of the Territories at least, every settler knows the importance of properly preparing his land. For several years after the country became open for settlement every one imagined that grain would grow, no matter how put in, but now the man is devoid of reason who thinks he is sure of a crop without any exertion on his part. It is true that since 1882 we have had one year in which the land required little or no preparation for the production of an abundant crop but only too many realize the loss in the remaining years from poor cultivation.

'Our seasons point to only one method of cultivation by which we may in all years expect to reap something.

'It is quite within the bounds of possibilities that some other and perhaps more successful method may be found, but at present I submit that 'fallowing' the land is the best preparation to ensure a crop. Fallowing land in this country is not required for the purpose of renovating it, as is the case with the worn-out lands in the East, and it is a question as yet unsettled how much or how little the fallow should be worked but as we have only one wet season during the year, it has been proved beyond doubt that the land must be ploughed the first time before this wet season is over, if we expect to reap a crop in the following year. The wet season comes during June and July, at a time when every farmer has little or nothing else to do, and it is then that this work should be done. Usually seeding is over by the 1st May and to secure the best results the land for fallow should be ploughed from 5 to 7 inches deep as soon after this date as possible. Land ploughed after July is of no use whatever unless the rains in August are much in excess of the average. A good harrowing should succeed the ploughing and all weeds or volunteer grain be kept down by successive cultivation. A good deal of uncertainty is felt with regard to a second ploughing, some holding that it is useless; others maintaining that it is an injury; while others again have found it to give from five to ten bushels per acre more than one ploughing. So far the experiments on the Experimental Farm have shown that by far the best returns have been received from two ploughings; and more noticeably was this the case when the first ploughing had been completed in May or June. Without doubt, two ploughings cause a greater growth of straw and consequently in a wet year the grain is several days later in maturing, causing greater danger from frost; but taking the seasons so far passed, 1884 excepted, two ploughings with as much surface cultivation as possible in between, may be safely recommended.

'Above all it is of the greatest importance that the first ploughing be as deep as possible, and that it be done in time to receive the June and July rains.'

After seventeen years' further experience and observation the following was written on this subject in the Annual Report of the Experimental Farms for 1906.

FROM REPORT OF 1906.

Methods of Preparing Soil for Grain Crops.

METHODS OF PREPARING NEW GROUND.

'In view of the fact that every year brings to the Northwest many new settlers who are unacquainted with the methods of breaking up and preparing new land for crop, a few suggestions with regard to this important work may not be amiss.

'In all sections where the sod is thick and tough, breaking and backsetting should be done; while in the districts where bluffs abound and the sod is thin, deep breaking is all that is necessary.

'The former is generally applicable to the southern and western portions, and the latter to the northeastern part of Saskatchewan, where the land is more or less covered with bluffs.

BREAKING AND BACKSETTING.

'The sod should be turned over as thin as possible, and for this purpose a walking plough with a 12 or 14-inch share, is the best. When the breaking is completed (which should not be later than the second week in July), rolling will hasten the rotting process and permit backsetting to commence early in August.

'Backsetting is merely turning the sod back to its original place, and at the same time bringing up two or three inches of fresh soil to cover it. The ploughing should be done in the same direction as the breaking and the same width of furrow turned. Two inches below the breaking is considered deep enough but three to four inches will give better results.

'After backsetting, the soil cannot be made too fine, and the use of disc or Randall harrow to cut up every piece of unrotted sod, will complete the work.'

DEEP BREAKING.

'Deep breaking, which in some sections of the country is the only practicable way of preparing new land, and which is, unfortunately, done in some instances where breaking and backsetting would give much more satisfactory results, consists in the turning over of the sod as deeply as possible, usually from four to five inches. When the sod has rotted, the top soil should be worked and made as fine as possible. The use of harrow or disc will fill up all irregularities on the surface, and make a fine, even seed bed.

'Whether the land is broken shallow or deep, it is necessary to have the work completed early, so as to take advantage of the rains which usually come in June or early in July. These rains cause the sod to rot, and without them, or if the ploughing is done after they are over, the sod remains in the same condition as when turned, and no amount of work will make up for the loss.'

SUMMER FALLOWS.

'The true worth of properly prepared fallows has been clearly demonstrated in past years in every district of Saskatchewan.

'The work of preparing land for crop by fallowing is carried on in so many ways in different parts of the country, that perhaps a few words on some of the methods employed may be of use to at least some of the new settlers.

'It has been observed in some parts of Saskatchewan that the land to be fallowed is not, as a rule, touched until the weeds are full grown and in many cases, bearing fully matured seed. It is then ploughed.

'By this method, which, no doubt, saves work at the time, the very object of a summer-fallow is defeated. In the first place, moisture is not conserved because the land has been pumped dry by the heavy growth of weeds; and, secondly, instead of using the summer-fallow as a means of eradicating weeds, a foundation is laid for years of labour and expense by the myriads of foul seeds turned under.

'The endless fields of yellow-flowered weeds, generally Ball Mustard (*Neslia paniculata*), testify to the indifferent work done in many districts, and, while no weed is more easily eradicated by a good system of fallows, there is no weed that is more easily propagated or takes greater advantage of poor work on fallows or of fall or spring cultivation.

'As has been pointed out in my previous reports, early and thorough work on fallows is absolutely necessary to success, and I here repeat the methods and results of tests carried on for some years past.

'*First Method.*—Ploughed deep (6 to 8 inches) before last of June; surface cultivated during the growing season, and just before or immediately after harvest ploughed 5 or 6 inches deep.

'Result—Too much late growth if season was at all wet, grain late in ripening, and a large crop of weeds if the grain was in any way injured by winds.

'*Second Method.*—Ploughed shallow (3 inches deep) before the last of June; surface cultivated during the growing season, and ploughed shallow (3 to 4 inches deep) in the autumn.

'Result.—Poor crop in a dry year; medium crop in a wet year. Not sufficiently stirred to enable soil to retain the moisture.

'*Third Method.*—Ploughed shallow (3 inches) before the last of June; surface cultivated during the growing season, and ploughed deep (7 to 8 inches) in the autumn.

'Result.—Soil too loose and does not retain moisture. Crop light and weedy in a dry year.

'*Fourth Method.*—Ploughed deep (7 to 8 inches) before the last of June; surface cultivated during the growing season.

'Result.—Sufficient moisture conserved for a dry year and not too much for a wet one. Few or no weeds, as all the seeds near the surface have germinated and been killed. Surface soil apt to blow more readily than when either of the other methods is followed. For the past fourteen years, the best, safest and cleanest grain has been grown on fallow worked in this way, and the method is therefore recommended.

'Fallows that have been ploughed for the first time after the first of July, and especially after July 15, have never given good results; and the plan too frequently followed of waiting till weeds are full grown, and often ripe, and ploughing under with the idea of enriching the soil, is a method that cannot be too earnestly advised against.

'In the first place, after the rains are over in June or early in July, as they usually are, no amount of work, whether deep or shallow ploughing, or surface cultivation, can put moisture in the soil. The rain must fall on the first ploughing and be conserved by surface cultivation.

'Weeds, when allowed to attain their full growth, take from the soil all the moisture put there by the June rains, and ploughing-under weeds with their seeds ripe or nearly so, is adding a thousand-fold to the myriads already in the soil, and does not materially enrich the land.'

During the past two years the term 'dry farming' has been applied to what was formerly known in the West as 'summer-fallowing.'

With the exception of the addition of the use of a soil-packer there is no change in the methods formerly employed, when the spring rains and frequent cultivation were depended upon for the packing of the soil.

Packers are, without doubt, most useful implements on the farm and where from any cause, the soil is loose, they should be used. They are, however, expensive implements and within the means of comparatively few of the new settlers. Fortunately, early ploughing and frequent shallow cultivation may be depended upon to produce almost equally satisfactory results in the majority of cases.

CULTIVATION OF STUBBLE.

When farmers summer-fallow one-third of their cultivated land each year, as they should, one-half of each year's crop will be on stubble. For wheat, the best preparation of this land is to burn the stubble on the first warm, windy day in the spring, and either cultivate shallow before seeding or give one or two strokes of the harrow after seeding, the object being to form a mulch to conserve whatever moisture may be in the soil, until the commencement of the June rains.

The portion intended for oats or barley, should be ploughed four or five inches deep and harrowed immediately; then seeded and harrowed as fine as possible. In

case time will not permit of ploughing, good returns may be expected from sowing the seed oats or barley on the burnt ground, and discing it in; then harrowing well.

FALL PLOUGHING.

With regard to fall ploughing it may be said that, as a rule, on account of short seasons and dry soil, very little work can possibly be done in the fall, but if the stubble-land is in a condition to plough and the stubble is not too long, that portion intended for oats and barley may then be ploughed, if time permits.

It is, however, a mistake to turn over soil in a lumpy or dry condition, as nine times out of ten it will remain in the same state until May or June, with insufficient moisture to properly germinate the seed, and the crop will very likely be overtaken by frost.

As to the quantity of seed sown and the depth of sowing, long experience has shown that the best results are had in Saskatchewan by the sowing of one and a half bushels of wheat per acre or two bushels of barley or oats. Sowing about two inches deep has given the most satisfactory returns, and the seed should be got in as early as is practicable.

HORSES.

Nine work horses were on the Farm for the past year, with two drivers.
A few days ago four registered brood mares were obtained.

CATTLE.

At present the herd consists of one Shorthorn bull three years old, three young bull calves, eighteen pure bred cows and heifers, fifteen head of yearlings and calves and five grades, cows and yearlings.

Fifteen steers were obtained last fall for feeding tests but had to be sold after the fire for want of room and feed.

SHEEP.

The flock of breeding animals consists of one pure bred Shropshire ram, and three ewes, eleven grade ewes and seven lambs.

One hundred lambs were obtained in the fall for feeding and were divided into four lots of twenty-five each.

The fire caused the test to be discontinued, and since then the animals are being disposed of as opportunities occur.

SWINE.

Berkshire and Yorkshire pigs are kept and at present there are one boar and one sow of the former and one boar and three sows of the latter.

Fifteen young pigs were sold for breeding purposes during the past year.

POULTRY.

Two breeds, Barred Plymouth Rocks and Black Minorcas, have been kept on the Farm for the past few years. Cockerels and eggs are sold.

DISTRIBUTION OF SAMPLES.

A distribution of samples of the products of the farm, was made in the spring to residents of Saskatchewan. The following is a list of the samples sent out:—

Potatoes, 3-lb. bags, 340.

Small seeds, 131 packages containing 2,358 packets of Flower, Garden and Shrub seeds.

Tree Seeds, Maple, 249 packages of 1-lb. each.

Tree Seeds, Ash, 18 packages of 1-lb. each.

Tree Seeds, Shrubs, 34 packages of 1-lb. each.

Tree and Shrub seedlings, 705 packages containing 75 trees each.

Express parcels, trees and shrubs, 29 packages containing 50 trees each.

Crab-apple and plum seedlings, 39 packages containing 12 trees each.

Rhubarb roots, 60 packages containing 6 roots each.

Inoculated soil, 265 packages of 100 lbs. each were taken from one of the old alfalfa plots and shipped to residents in the province, the applicants paying freight charges and cost of bag.

CORRESPONDENCE.

During the twelve months ending March 31, 1912, 16,407 letters were received and 16,296 mailed from this office.

In letters received, reports on samples are not included, and in letters mailed circulars of instructions sent out with samples are not counted.

METEOROLOGICAL RECORDS.

Month.	Temperature. F.					Rainfall.		Snowfall.	Sunshine.
	Maximum.		Minimum.		Mean.				
1911.	Date.	°	Date.	°	°	Days.	Inches.	Inches.	Hours.
April	26	73	3	2	35 90	1	·04	2·5	236·9
May	5	90	1	15	50·16	6	2·57	12·	224·2
June	18	92	26	38	62 34	7	4·28	.....	225·9
July	15	86	16	36	59·	11	3·03	.....	266·9
August	13	86	25	31	58·09	12	3·53	.....	235·9
September	13	79	24	20	48·20	5	·82	.....	158·7
October	9	78	31	— 2	38·58	3	1·95	·50	134·6
November	4	56	14	—20	13·	.....	.....	10·85	103·7
December	4	40	28	—31	9·58	.....	.....	3·50	53·3
1912.									
January	30	36	11	—47	—8·06	.....	.....	3·45	68·8
February	15	35	3	—26	7·41	.....	.....	1·50	101·9
March	27	42	1	—28	6·93	.....	.....	4·	156·4
						45	16·22	38·30	1,967·2

* Reckoning ten inches of snowfall as equivalent to one inch of rainfall, the total precipitation for the year ending March 31, 1912, was 20·05 inches.

I have the honour to be, sir,
Your obedient servant,

ANGUS MACKAY,
Superintendent.

EXPERIMENTAL STATION FOR CENTRAL SASKATCHEWAN.

REPORT OF WM. A. MUNRO, B.A., B.S.A., SUPERINTENDENT.

ROSTHERN, SASK., March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director Experimental Farms,
Ottawa, Canada.

SIR,—I have the honour to present herewith the third annual report of the Dominion Experimental Station at Rosthern, Sask.

The season of 1911 opened for seeding operations about the middle of April and was characterized by a very average rainfall, well distributed throughout its whole length. There was not a downpour at any time sufficiently heavy to cause water to run off the land, but all the rain which fell was absorbed. This condition was favourable for a luxuriant growth of all kinds of crops including trees and shrubs. While stimulating growth, however, these conditions retarded the maturing of the crops, with the result that much grain was unripe when the first severe frost came on August 26. Not only at the Experimental Station was the grain damaged by frost but the condition existed throughout a large portion of the province.

SPRING WHEAT.

Fifteen varieties of spring wheat were grown on one-fortieth acre plots. These were sown on April 24.

Number.	Variety.	Days Maturing.	Yield per Acre.		Weight per Measured Bushel after Cleaning.
			Bush.	Lbs.	
1	Huron	107	73	20	59
2	Marquis	98	70	..	61
3	Preston. (Seed from Seager Wheeler)	107	66	40	56·5
4	Chelsea.	102	66	..	58
5	Pringle's Champlain	102	65	20	57·5
6	Riga	107	64	40	55
7	Stanley.	107	62	40	57·2
8	Bobs.	102	62	..	59
9	Red Fife. (Geo. L. Smith)	98	60	..	56
10	Early Red Fife	107	60	..	55·5
11	White Fife	107	59	20	50·5
12	Bishop	102	58	40	57·5
13	Red Fife	107	55	20	51·2
14	Red Fife "Regenerated"	107	50	..	49·5
15	Kubanka.	107	37	20	51·8

OATS.

Fifteen varieties of oats were under test. Those marked below 6 for strength of straw were lodged and difficult to cut.

Number.	Variety.	Days Maturing.	Strength of Straw.	Yield per Acre.		Weight per Measured Bushel after Cleaning.
				Bush.	Lbs.	
1	Banner	127	5	131	26	39
2	Danish Island	127	4	130	20	38
3	20th Century	131	6	128	8	38·5
4	Irish Victor	127	5	128	8	37·5
5	Improved American	128	4	127	2	37
6	Gold Rain	131	7	127	2	38·2
7	Abundance	131	4	125	30	37·2
8	Abundance "Regenerated"	131	6	121	6	36
9	Ligowo	131	4	121	6	40
10	Swedish Select	131	5	117	22	39
11	Thousand Dollar	131	5	116	16	35
12	Siberian	135	7	109	14	36·5
13	Victory	131	7	109	14	39·5
14	Daubeney Selected	118	5	101	6	36
15	Sixty Day White	118	8	96	16	34·8

BARLEY.

Six varieties of two-row barley and nine varieties of six-row barley were grown on fortieth-acre plots. All but Early Indian made rank growth and those marked below 6 for strength of straw were considerably lodged. The Early Indian is a very short-strawed variety and very early, but in our case was badly infested with rust. Notwithstanding its rust and light yield, its earliness is so commendable that we shall continue to try it.

Number.	Variety.	Days Maturing.	Strength of Straw.	Yield Per Acre.		Weight per Measured Bushel after Cleaning.
				Bush.	Lbs.	
	Six-Row Varieties.					
1	Odessa	114	5	100	40	42·8
2	Manchurian	114	5	96	32	43·
3	O. A. C. No. 21	114	5	94	8	41·4
4	Black Japan	106	9	93	16	42·5
5	Stella	114	5	83	16	45·5
6	Mensury	109	8	81	32	43·8
7	Taganrog	109	4	81	32	43·5
8	Success	105	8	58	16	40·8
9	Early Indian	100	10	19	8	35·5
	Two-Row Varieties.					
1	Duckbill	114	4	85	..	45·5
2	Hannchen	113	3	81	32	50·5
3	Early Chevalier	107	8	79	8	50·8
4	Swan's Neck	114	3	78	16	48
5	Swedish Chevalier	114	3	71	32	44·5
6	Beaver	112	6	70	40	38·5

FIELD PEAS.

Ten varieties of field peas were grown on summer-fallow. The vines remained green till the frost came, as a consequence of which the germination of the threshed product was of a low percentage. The 'Arthur Selected' was nearer maturity than any of the others.

Number	Variety.	Yield.		No.	Variety.	Yield.	
		Bush.	Lbs.			Bush.	Lbs.
1	Arthur Selected	51	20	6	Chancellor	37	20
2	Mackay	48	..	7	White Marrowfat	36	..
3	Paragon	48	..	8	Wisconsin Blue	31	20
4	Prussian Blue	46	40	9	Black-eye Marrowfat	26	40
5	English Grey	38	..	10	Golden Vine	24	40

INDIAN CORN FOR ENSILAGE.

Seven varieties of fodder corn were grown and an estimate of yield made from two rows each 66 feet long. None of this corn came to tassel before the frost. Two sowings of each variety were made, one on May 19 and the other on June 14.

Number.	Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.	
		Tons.	Lbs.	Tons.	Lbs.
1	Compton's Early	11	1760	9	876
2	Longfellow	10	1780	9	1800
3	Selected Leaming	10	1020	8	1160
4	Northwestern Dent	9	1140	9	1140
5	Superior Fodder	8	1820	6	540
6	Eureka	8	1820	9	1140
7	Angel of Midnight	8	1160	8	1114

FIELD ROOTS.

Three varieties of sugar beets, eight varieties of mangels, five varieties of carrots and ten varieties of turnips were grown on summer-fallowed land, and the yield in each case computed from a row 66 feet long. Two sowings of each were made, one on May 19 and one on June 13.

Number	Variety.	Yield per Acre, 1st Sowing.		Yield per Acre, 2nd Sowing.	
	Sugar Beets.	Tons.	Lbs.	Tons.	Lbs.
1	Klein Wanzleben	12	552	7	520
2	Vilmorin's Improved	12	156	6	1,728
3	French Very Rich	11	1,760	8	1,160
	Mangels.				
1	Half Sugar White	26	800	15	1,812
2	Giant Yellow Globe	21	636	13	400
3	Selected Yellow Globe	21	636	9	1,536
4	Gate Post	20	788	13	1,060
5	Mammoth Long Red	19	1,600	12	816
6	Perfection Long Red Mammoth	19	280	14	776
7	Giant Yellow Intermediate	16	1,396	8	896
8	Yellow Intermediate	16	1,000	8	1,820
	Carrots.				
1	Improved Short White	12	24	5	1,880
2	Mammoth White Intermediate	11	1,760	6	1,200
3	White Belgian	11	440	4	1,240
4	Ontario Champion	9	1,536	5	824
5	Half Long Chantenay	9	1,008	4	580
	Turnips.				
1	Hall's Westbury	25	1,348	9	876
2	Mammoth Clyde	25	556	13	1,980
3	Jumbo	23	728	13	1,720
4	Bangholm Selected	22	88	12	816
5	Halewood's Bronze Top	21	1,824	12	816
6	Carter's Elephant	21	1,164	8	104
7	Good Luck	20	920	11	836
8	Hartley's Bronze	19	1,676	14	1,304
9	Magnum Bonum	18	168	13	1,060
10	Perfection Swede	16	340	11	440



Plot of Beaver Barley, Experimental Station, Rosthern, Sask.



Grading Roads with the Split-log Drag, Experimental Station, Rosthern, Sask.

POTATOES.

Seventeen varieties of potatoes were grown on summer-fallowed land and the yield computed in each case from one row 66 feet long.

Number.	Variety.	Colour.	Yield per Acre.	
			Bush.	Lbs.
1	Empire State	White	585	12
2	Dreer's Standard	"	528	..
3	Money Maker	"	514	28
4	Everett	Red	497	12
5	Reeves' Rose	"	484	..
6	Ashleaf Kidney	White	479	36
7	Morgan Seedling	"	475	12
8	Rochester Rose	Red	453	12
9	Gold Coin	White	453	12
10	Dalmeny Beauty	"	448	48
11	Vick's Extra Early	Red	431	12
12	Late Puritan	White	431	12
13	Irish Cobbler	"	365	12
14	Carman No. 1	"	356	24
15	American Wonder	"	264	..
16	Hard-to-Beat	"	206	48
17	Factor	"	193	36

ROTATION EXPERIMENTS.

Four rotations were begun in the spring of 1912, each plot in each rotation being exactly two acres in area. As well as being an experiment in rotations, careful record is kept of all labour, both horse and manual, all wear and tear of machinery, cost of manure and seed, and revenue from all products received from the different rotations, with the idea of arriving at an estimate of the cost of production.

The rotations are as follows:—

Rotation 'C.'

1. Wheat.
2. Wheat.
3. Summer-fallow.

Rotation 'J.'

1. Summer-fallow.
2. Wheat.
3. Wheat.
4. Oats seeded down.
5. Hay.
6. Pasture.

Rotation 'P.'

1. Summer-fallow.
2. Wheat.
3. Wheat.
4. Summer-fallow.
5. Hoed crop or Legume.
6. Barley seeded down.
7. Hay.
8. Pasture.

Rotation 'R.'

1. Summer-fallow.
2. Hoed Crop or Legume.
3. Wheat.
4. Oats.
5. Summer-fallow.
6. Wheat.
7. Oats seeded down.
8. Hay.
9. Pasture.

CULTURAL INVESTIGATION WORK.

In the spring of 1911 was begun a series of thirteen experiments in Cultural Investigation work. This included experiments in Prairie Breaking, Depth of Ploughing, Summer-fallow Treatment, Stubble Treatment, Seeding to Grass and Clover, Breaking Sod, Applying Barnyard Manure, Green Manuring, Seed bed Preparation, Soil Packers, Depth of Seeding, Commercial Fertilizers and Underdraining. The part devoted to this work comprises an area of twenty-one acres and is divided into 493 fortieth-acre plots. The work in 1911 was preliminary in character.

VEGETABLE GARDEN.

There is but a small area enclosed by a windbreak, and in this we grew as much as we could of the vegetable and flower garden. Beans, peas, parsnips, turnips, beets and carrots were sown in the open on land which had been previously summer-fallowed, but they came to nought because of the cutworm. The tomatoes, cucumbers, melons and squash, although started in the hot-bed and planted within the sheltered enclosure, failed to mature before the frost, although strong growth was made throughout the season. The corn also did not mature.

CABBAGE.

Sixteen varieties of cabbage were sown on April 19 and transplanted on May 29 and made remarkable growth, one head of the Flat Swedish weighing 25 lbs. 4 oz. and eight heads of the same variety averaging 15 lbs. each.

CAULIFLOWER.

Three varieties of cauliflower were sown and transplanted on the same dates as the cabbage and were ready for use by the end of July. The Extra Selected Early Erfurt Dwarf produced the largest percentage of good heads.

ONIONS.

Six varieties of onions were grown in rows thirty feet long with the following yields:—

Dark Wethersfield	20 lbs.
Yellow Globe Danvers	19 "
Salzer's Wethersfield	16½ "
Southport Red Globe	16 "
Johnson's Dark Red Beauty	15 "
Large Red Wethersfield	8 "

Yellow Globe Danvers was considered to be of the best quality. Large Red Wethersfield might have made a better showing but was thin in the row.

FRUITS.

Among upwards of four hundred apple trees received in 1909 and transplanted in 1910, more than 80 per cent. came through the winter of 1911 in good condition. The vacancies were filled and two more rows of twenty trees each added in 1911.

The bush fruits planted in 1910 did not do well because of the dry season and the consequent drifting sand, and a new plantation was put out in 1911 consisting

of nine varieties of black currants, fourteen varieties of red and white currants, two varieties of gooseberries and four varieties of raspberries. The rows were six feet apart and between the rows of bush fruits were sown two rows of sunflowers. The sunflowers soon became a protection from the wind and in the winter served to lodge the snow and afford a splendid protection, with the result that the plants appeared in the spring in good condition.

TREES AND SHRUBS.

About two hundred ornamental shrubs and trees were planted along the driveway and about the lawn in 1911, and all the deciduous ones did well. The evergreens, however, including varieties of spruce, fir and pine which came from outside the province, nearly all died. Forty native spruce were obtained from the timber reserve ten miles north of Duck Lake and all but one came through to the spring of 1912 in good condition.

Nearly two acres of lawn were seeded in 1911. Half was seeded with a thin sowing of barley as a nurse crop, but, as the season was moist, no particular advantage seemed to accrue from this method. The season previous, the lawn had been seeded without a nurse crop, but the summer being dry, the seed did not germinate and was blown out.

PLANTS AND FLOWERS.

Good success has been obtained with bulbs both in bedding outside and in potting in the house. The directions were followed as per W. T. Macoun's Bulletin on Bulb Culture.

Three hundred bulbs of Narcissi, Tulips and Hyacinths were potted in November, well watered and placed in a cool, dark cellar. They were watered at intervals of from two to three weeks, and the first ones were brought to a light room during the Christmas holidays. About a week after being brought to the light in a warm room and well watered, the flower opens and lasts nearly two weeks. A continuous bloom was obtained from the Christmas holidays until April.

A large number of varieties of flowering annuals, including six varieties of Asters, four Balsams, three Celosia, one Coreopsis, six Dianthus, one Eschscholtzia, Gaillardia, two Godetia, Lobelia, Mignonette, Nicotiana, Pansies, Phlox, Poppies, Portulaca, Salpiglossis, Scabiosa, Stocks, Nasturtiums and Zinnias, all made good growth and in most cases came to flower before frost. These plants were started in the hot-bed and transplanted to a sheltered enclosure in the middle of May.

LIVE STOCK.

There are five work horses and one driver on the Station. After the commencement of the Cultural Investigation work, another horse was found necessary.

There are two grade dairy cows which supply sufficient milk for the needs of the families living on the Station.

LABOUR.

Accommodations for the men employed on the Station were much improved in 1911 over those of 1910. The house formerly occupied by the foreman was divided and enlarged and part of it converted into a boarding house. This served as an inducement for a better class of labour. Of the men engaged in May as many as were required remained until after harvest.

ACKNOWLEDGMENTS.

Mr. James Dunlop assumed the duties of foreman in November, 1910, and has been unremitting and efficient in his work ever since. His management of the men and his grasp of the work are very creditable.

Credit is due the Secretary of the Board of Trade in Saskatoon for supplying us with an efficient class of labourers.

CORRESPONDENCE.

During the year there were 873 letters received and 535 sent out, irrespective of circulars.

METEOROLOGICAL RECORDS.

Month.	Temperature. F.				Mean.	Precipitation.	Hours of Sunshine.
	Date.	Max.	Min.	Date.			
April	23	72·7	1·7	6	37·1	0·86	231·8
May	6	82·2	27·2	20	48·0	2·38	219·1
June	20	84·7	38·2	9	61·1	3·55	262·0
July	7	87·5	38·6	24	56·9	2·89	270·0
August	20	84·8	32·2	27	56·0	1·79	280·6
September	11	71·1	20·8	25	46·7	1·81	193·7
October	9	78·1	4·7	31	38·1	.....	170·5
November	5	51·0	-28·1	15	9·1	0·90	130·5
December	3	32·4	-42·8	31	7·6	0·85	60·4
January	31	34·4	-54·1	11	-12·52	0·30	101·6
February	16	39·3	-27·8	4	5·5	0 30	115·7
March	28	40·4	-30·0	2	4·09	0·60	222·7

NOTE.—In the above table, ten inches of snow is taken as equivalent to one inch of rainfall or precipitation.

I have the honour to be, sir,
Your obedient servant,

WM. A. MUNRO,
Superintendent.

EXPERIMENTAL STATION FOR NORTH-WESTERN SASKATCHEWAN.

REPORT OF R. E. EVEREST, B.S.A., SUPERINTENDENT.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa, Canada.

SCOTT, SASK., March 31, 1912.

SIR,—I have the honour to submit to you the second annual report of the work done with the results obtained on the Experimental Station for Northwestern Saskatchewan at Scott for the year ending March 31, 1912.

In the spring of 1911 work on the land was possible about April 15. Harrowing was commenced on April 18 and the first wheat was sown in field lots on April 29.

Grain crops germinated well and came up evenly. When about three inches of growth had been attained the dry condition of the soil apparently was affecting the plants, shown by the edges of the outer leaves taking on a blighted, whitish colour. This condition was soon corrected by frequent good rains and the succeeding summer's growth of all cereal crops was remarkable.

By the beginning of August grain crops were fully in head and turning well for harvest. The promise was good. On August 13, in the evening, a severe wind, rain and hail storm passed through this neighbourhood almost totally destroying the maturing grain. That which remained was injured to such an extent that with continued backyard, cool weather, ripening was prolonged till early frosts further affected the yield in quality and quantity.

The season for fall work was short. By October 28 the plough was stopped. On November 1 the thermometer registered below zero and from then up till March 21, 1912, favourable winter weather prevailed.

EXPERIMENTS WITH SPRING WHEAT.

Six varieties of spring wheat were sown on May 17 at the rate of about one and three-quarters bushels per acre. The land in 1910 had been broken shallow out of prairie, packed, left till after harvest when it was backset five inches deep, single disced and double harrowed. The growth and general appearance of these crops were satisfactory until reduced first by storm and later with frost.

Each plot was one-fortieth of an acre in size, and the soil was a chocolate clay loam with a clay subsoil. The threshed grain from these plots is of poor quality.

SPRING WHEAT—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Cutting.	Number of days Maturing.	Kind of Head.	Weight of Straw.	Yield per Acre.	
					Lbs.	Bush.	Lbs.
Huron	May 17	Sept. 19	125	Bearded	3,670	5	30
Marquis	" 17	" 12	118	Bald	4,560	4	..
Early Red Fife	" 17	" 19	125	"	4,240	2	40
Stanley	" 17	" 19	125	"	3,040	2	40
Preston	" 17	" 19	125	Bearded	2,525	1	15
Red Fife	" 17	" 19	125	Bald	2,730	1	10

SPRING WHEAT—Quantities of Seed.

Marquis spring wheat was used on four plots in the quantities of seed per acre test. Under the conditions which prevailed last season the largest quantity of seed gave the best return.

Variety.	Bushels Seed per Acre.	Number of Days Maturing	Weight of Straw.	Yield per Acre.	
			Lbs.	Bush.	Lbs.
Marquis	¾	125	3,475	2	5
"	1¼	118	4,000	3	20
"	1¾	118	4,560	4	..
"	2¼	118	3,880	5	20

YIELDS OF SPRING WHEAT IN FIELD LOTS.

The Huron variety was used in all field lots of spring wheat. These fields were sown on April 29 and May 1. Six lots were mostly on breaking and backsetting and two were on deep breaking. In general appearance the wheat on deep breaking had the advantage of that growing on the land shallow broken and backset and was ahead in yield which fact, however, is of no value, for these two lots were not so near the storm centre as the other six were. Growth of all the wheat was remarkable as they were nearing maturity ahead of earlier sown fields. The only known difference in treatment to other fields in the locality is that when grain was about three inches high and threatened with drought, the fields here were given one stroke with the drag harrow.

The seed was sown at the rate of one and three-quarters bushels per acre.

Variety.	Yield.	Size of Plot.	Date of Sowing.	Date of Cutting.	Days Maturing.	Kind of Head.	Yield per Acre.	
		Acres.					Bush.	Lbs.
Huron	Rot. C. 2...	1·5	April 29..	Sept. 9..	133	Bearded..	6	23
"	" C. 3...	1·5	May 1..	" 9..	131	" ..	7	47
"	" J. 2...	2·2	" 1..	" 7..	129	" ..	12	57
"	" J. 3...	2·2	" 1..	" 7..	129	" ..	18	4
"	" P. 2...	1·5	" 1..	" 9..	131	" ..	5	20
"	" P. 3...	1·5	" 1..	" 9..	131	" ..	8	7
"	" R. 3...	2·3	April 29..	" 11..	135	" ..	5	26
"	" R. 6...	2·0	" 29..	" 11..	135	" ..	8	12

EXPERIMENTS WITH OATS.

Five varieties of oats were sown on May 17 at the rate of about two and one-quarter bushels per acre. The land in 1910 had been broken shallow out of prairie, packed, left till after harvest when it was backset five inches deep, single disced and double harrowed. Each plot was one-fortieth of an acre in size and the soil was a chocolate clay loam with a clay subsoil. These varieties were almost totally destroyed by storm.

Oats—Test of Varieties.

Name of Variety.	Date of Sowing.	Date of Cutting.	Number of Days Maturing.	Kind of Head.	Weight of Straw.	Yield per Acre.
					Lbs.	Bush. Lbs.
White Giant	May 17	Sept. 12	118	Branching	3,260	4 4
Banner	" 17	" 12	118	"	4,280	3 18
Abundance	" 17	" 13	119	"	3,900	2 32
Danish Island	" 17	" 12	118	"	3,125	2 7
Improved Ligowo	" 17	" 13	119	"	2,140	1 26

Oats—Quantities of Seed.

White Giant oats were sown in eight different amounts per acre commencing at one and one-quarter bushels and increasing one-half bushel on a plot until four and three-quarters bushels per acre was reached. The returns obtained under last season's conditions do not point to any particular amount as giving the best result. These plots were almost totally destroyed by storm.

Variety.	Bushels Seed per Acre.	Number of Days Maturing.	Weight of Straw.	Yield per Acre.
			Lbs.	Bush. Lbs.
White Giant	1¼	118	3.670	3 28
"	1¾	118	3,710	2 22
"	2¼	118	3,260	4 4
"	2¾	118	3,900	2 32
"	3¼	118	3,470	3 28
"	3¾	118	4,245	4 19
"	4¼	118	4,320	2 12
"	4¾	118	5,110	2 22

Oats—Depths of Seeding.

Two plots were sown to White Giant oats, one with the drill set at the shallowest notch, the second with the drill set at the deepest notch.

More grain was harvested from the shallow than from the deep-sown plot. These plots were almost totally destroyed by storm.

Variety.	Set of Drill.	Number of Days Maturing.	Weight of Straw.	Yield per Acre.
			Lbs.	Bush. Lbs.
White Giant	Shallow	118	3,840	4 24
"	Deep	118	4,465	3 33

YIELD OF OATS IN FIELD LOT.

One field lot of White Giant oats was threshed. This lot is an object lesson as to the extent of storm damage. The grain stood beautifully and seventy-five bushels per acre appeared to be a safe estimate. Following the storm the grain was still standing and to the casual observer not much the worse; to the closest and severest inspection a seventy-five per cent damage was estimated, and the lot actually threshed about eight bushels per acre. Oats, owing probably to the size and spread of the head, suffer to a greater extent than wheat in severe storm.

Variety.	Field.	Size of Plot.	Date of Sowing.	Date of Cutting.	Days Maturing.	Kind of Head.	Yield per Acre.
		Acres.					Bush. Lbs
White Giant	Rot. J. 4..	2·2	May 8.....	Sept. 7....	122	Branching..	8 1

OATS AND PEAS AND OATS FOR GRAIN FEED.

Six lots of peas and oats and two lots of oats were harvested as green feed. A considerable amount of feed was obtained per acre which, on account of lack of grain, was not highly nutritive. A larger return was obtained from the peas and oats than from oats alone. In the former a heavier seeding was given, the latter were first intended for grain crop and seeded at the ordinary rate which in part may account for the difference in yield.

Kind of Crop.	Field.	Size of Plot.	Date of Sowing.	Date of Cutting.	Yield per Acre.
		Acres.			Lbs.
Peas and Oats.....	Rot. J. 5..	2·2	May, 26..	Sept., 8..	5,741
" "	" " 6..	2·2	" 26..	" 7..	4,650
" "	" P. 7..	1·5	" 29..	" 8..	4,773
" "	" " 8..	1·5	" 26..	" 8..	5,300
Oats.....	" R. 4..	2·3	" 6..	" 11..	3,826
"	" " 7..	2·0	" 8..	" 11..	4,355
Peas and Oats	" " 8..	2·3	" 29..	" 8..	4,372
" "	" " 9..	2·3	" 26..	" 8..	4,409

BARLEY AND PEAS.

Barley and peas were sown in plots for variety tests, and also single varieties in field lots. The growth of these crops was excellent, particularly in the field lots. The barley, which was within a few days of cutting when injured, looked good for a heavy yield. These crops, however, were totally destroyed and no return is possible.

16—1913—352



Trial Plots of Barley at the Scott Experimental Station.



Part of Flower Border at the Scott Experimental Station.

ALFALFA.

In the past summer a block was seeded to alfalfa of the Turkestan variety; the catch was good and the plants went into the winter with considerable top. This plot was inoculated with soil received from the Experimental Farm, Indian Head, Sask.

WINTER WHEAT.

Three seedings were made with two varieties of winter wheat, on August 9, August 15 and September 1. The varieties Alberta Red and Dawson's Golden Chaff were sown. The first two seedings had a moderate top at the conclusion of the growing season. The last seeding was not far advanced at freezing time.

ROTATIONS.

Four rotations were laid out and started last season. They are known as Rotation C, Rotation J, Rotation P and Rotation R.

ROTATION 'C'. THREE YEARS.

This rotation comprises 4·5 acres and was commenced as follows:—

First year—Summer-fallow.
Second year.—Wheat.
Third year.—Wheat.

ROTATION 'J'. SIX YEARS

This rotation comprises 13·2 acres, each plot containing 2·2 acres and was commenced as follows:—

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Wheat.
Fourth year.—Oats seeded down.
Fifth year.—Peas and oats seeded down.
Sixth year.—Peas and oats.

ROTATION 'P'. EIGHT YEARS.

This rotation comprises 12 acres, each plot containing 1·5 acres and was commenced as follows:—

First year.—Summer-fallow.
Second year.—Wheat.
Third year.—Wheat.
Fourth year.—Summer-fallow.
Fifth year.—Peas.
Sixth year.—Barley seeded down.
Seventh year.—Peas and oats seeded down.
Eighth year.—Peas and oats.

ROTATION 'R'. NINE YEARS.

This rotation comprises 20·7 acres, each plot containing 2·3 acres, and was commenced as follows:—

First year.—Summer-fallow.
Second year.—Peas.
Third year.—Wheat.
Fourth year.—Oats.
Fifth year.—Summer-fallow.
Sixth year.—Wheat.
Seventh year.—Oats seeded down.
Eighth year.—Peas and oats seeded down.
Ninth year.—Peas and oats.

On each plot seeded down the following mixture of seed was used:—

	Per Acre.
Western rye grass	10 lbs.
Alfalfa	3 "
Red clover	3 "

POTATOES.

Seventeen varieties of potatoes were tested in 1911, and in view of unfavourable weather conditions made a very good return. In the majority a fair size was attained, and in some varieties the cooking quality was excellent. All have proved sound and good keepers. The land in 1910 had been broken shallow out of prairie, packed, left till after harvest when it was backset five inches deep, single disced and double harrowed. In 1911 the ground was drag harrowed in early spring, later double disced, drag harrowed and packed. For planting the potatoes were cut into pieces with two eyes in each, and these pieces were planted in rows two and one-half feet apart the sets being placed one foot apart in the row. During the growing season the potatoes were scuffled and hoed as required to keep down weeds and loosen the soil. At the last stroke with the scuffer the moulds were turned out and some earth thrown to the rows.

POTATOES—Test of Varieties.

Name of Variety.	Planted.	Dug.	Aver. Size.	Quantity.	Total Yield per Acre.	Yield per Acre of Marketable.	Yield per Acre of unmarketable.	Form and colour.
				P.C.	Bu. Lbs.	Bu. Lbs.	Bu. Lbs.	
Everett	June 2	Sept. 23	Medium	85	328 54	240 54	88 ..	Red oval.
Ashleaf Kidney	" 2	" 23	"	90	302 30	238 59	63 31	Pink oval.
Empire State	" 2	" 22	"	80	286 ..	231 40	54 20	White oval.
Irish Cobbler	" 2	" 22	"	80	279 24	212 21	67 3	White round.
Morgan Seedling	" 2	" 22	"	85	268 24	179 30	88 34	Pink long.
Late Puritan	" 2	" 22	"	90	264 .	211 12	52 48	White oval.
Dreer's Standard	" 2	" 22	"	80	255 12	183 55	71 27	" "
Reeves' Rose	" 2	" 22	"	95	254 6	188 3	66 3	Red oval.
Dalmeny Beauty	" 2	" 22	"	90	240 54	163 49	77 5	White long.
Rochester Rose	" 2	" 22	"	80	234 18	175 44	58 34	Pink long.
Money Maker	" 2	" 22	"	85	225 30	178 9	47 21	White long.
Gold Coin	" 1	" 22	"	95	220 .	182 36	37 24	White oval.
Carman No. 1	" 1	" 22	"	90	200 12	158 10	42 2	" "
Factor	" 2	" 22	Small	90	199 6	95 35	103 31	White flat and long.
American Wonder	" 2	" 22	Medium	80	193 36	145 12	48 24	White oval.
Hard to Beat	" 2	" 23	Small	70	193 36	114 14	79 22	White long.
Vicks' Extra Early	" 2	" 22	Medium	85	165 ..	117 9	47 51	Pink oval.

ORCHARD.

On May 11, 1911, under the supervision of Mr. Macoun, Dominion Horticulturist, an orchard was staked out and tree setting commenced.

The plan of laying out adopted proved to be quick and accurate. The trees are set on the square, eighteen feet apart in the row and the rows have eighteen feet space between.

The plan as followed was:—The area was first measured and a stake placed for each row on the sides and across the ends. For this purpose six-inch garden labels were used. Then, commencing on the side for the second row, a sighting picket was placed at the stake marking the second row at each end. At one end one man remained and sighted for a line of eighteen-inch two-by-two stakes which were driven at distances not exceeding one hundred feet. Next, the one hundred-foot tape was carried down along this stake line, a third man carrying six-inch labels sighted the tape true and then placed a pin at the required distance for each tree. The hole diggers followed with a notch board, the centre notch was adjusted on the tree-marking pin; other pins were placed, one in the slot at each end of the board, the board was then removed, and the tree hole dug at centre pin. The planters followed with a similar board which was placed on the two pins remaining, the tree was then set to centre notch of board, which marked its position. This method of lining and marking for trees was fast. Its accuracy depended to quite an extent on the man sighting.

In the orchard, apple, plum and cherry trees were set out, with bush fruits and plants occupying the space between rows over a small area.

Forty-two varieties of apples were set out with a total of five hundred and thirty-four trees. The following are the varieties:—

Alberta,
Anisim,
Antonovka,
Bruno,
Charlamoff,
Clair,
Clive,
Duchess,
Florence,
Golden,
Granby,
Hoadly,
Hibernal,
Hyslop,
Jewel,
Kelso,
Lowland Raspberry,
Lubsk Queen,
Martha,
Mendel,
Milwaukee,
Okabena,
Oscar,
Osman,
Patten's Duchess,
Patten's Greening,
Percival,
Pioneer,
Roberval,
Robin,
Rupert,
Russian Seedling,
Silvia,
Sorel,
Petofsky,
Pony,
Transcendent,
Virginia,
Walton,
Wealthy,
Whitney,
Yellow Transparent.

Seventeen varieties of plums were set out with a total of one hundred and eighteen trees. The following are the varieties:—

Aitkin,
Bixby,
Cheney,
Cheresoto,
Etopa,
Ezaptan,
Hanska,
Inkpa,
Kaga,
Mankato,
Odegard,
Omaha.
Opata,
Sansoto,
Sapa,
Skuya,
Poka.

Ten trees of Compass cherry were set out.

Twenty-three varieties of currants were planted with a total of one hundred and thirty-four bushes. The varieties are as follows:—

Lee's Prolific,	Buddenborg's,	Red Dutch,
Boskoop Giant,	Victoria Black,	Greenfield,
Raby Castle,	Success,	Victoria Red,
Stewart,	Collin's Prolific,	Red Grape,
White Cherry,	Topsy,	Wilder,
White Grape,	Clipper,	Pomona,
Large White,	Franco-German,	Cumberland.
Eagle,		

Six varieties of gooseberries were planted with a total of eighteen bushes. The following are the varieties:—

Carrie,	Houghton,	Red Jacket,
Downing,	Pearl,	Transparent.

Sixteen varieties of strawberries were put in with a total of seven hundred and fourteen plants. The varieties are as follows:—

Bederwood,	Lovett,	Splendid,
Clyde,	Nettie,	Warfield,
Crescent,	New Dakota,	Wilson,
Enhance,	Sample,	Wm. Belt,
Glen Mary,	Senator Dunlap,	3 W. S.
Haverland,		

The season of 1911 was favourable for this work of planting and starting trees and bushes, and the result was that a great majority of the trees and plants that were received and set in in good shape took root and made favourable growth. Later in the season, storms injured to some extent the bark and foliage, thus weakening the trees to withstand the severity of the winter.

In bush fruits, currants and raspberries did well and made a fair growth, some varieties beginning to bear.

A few varieties of strawberries made a good start blossoming freely and sending out runners, while others failed to root or establish themselves.

In addition to the orchard and small fruits, considerable work was done in setting out hedges and tree rows for ornamental and protective purposes.

VEGETABLES.

In the fore part of June, seeds were sown in the open of the vegetables in common use, such as turnips, beets, carrots, lettuce, peas, beans, onions and radish. Of these, the peas, beans, lettuce, onions and radish made rapid growth and were quite productive.

FLOWERS.

Fifty-five varieties of annuals were sown in the open about the middle of June. Of these special mention may be made for persistent beautiful bloom of the following:—

Alyssum,	Royal Marigold,	Nemophila insignis,
Maritimum,	Candytuft,	Poppy,
Calendula,	Mignonette,	Pansy.
Eschscholtzia,		

A number of these retained their brightness after the frosts had become quite pronounced.

LIVE STOCK.

In the spring of 1911, seven work horses were purchased, four young geldings of the Clydesdale breed of good quality and size, and three of the agricultural class (two mares and a gelding), all of good quality. These horses have all proved kind and good in harness. The mares are kept for breeding purposes as well as for work, and at present are carrying foals. The seven horses are now in a healthy condition.

CORRESPONDENCE.

From March 25, 1911, to March 31, 1912: letters received, 646; letters sent, 565.

METEOROLOGICAL REPORT.

DATING FROM RECEIPT OF EQUIPMENT.

Months.	Highest Temperature. F.		Lowest Temperature. F.		Precipitation.	Hours Sunshine.
1911.	Date.	Degrees.	Date	Degrees.	Ins.	
May	.....	.....	.....	.....	2·20	.....
June	18	85·4	7	32·9	4·08	273·3
July	25	81·0	12	31·6	3·95	289·3
August	19	84·0	27	29·5	2·71	292·3
September	10	73·9	25	22·2	1·92	171·3
October	8	80·5	31	4·7	·11	180·1
November	3	50·1	13	—21·8	·25	106·4
December	2	36·0	31	—37·8	·65	56·4
1912.						
January	21st	31·8	11	—48·3	·37	100·8
February	15th	36·5	29	—30·3	·08	97·3
March	27th	46·0	1	—31·8	·23	199·0
					16·55	1766·3

I have the honour to be, sir,
Your obedient servant,

R. E. EVEREST,
Superintendent.

EXPERIMENTAL FARM FOR SOUTHERN ALBERTA.

REPORT OF W. H. FAIRFIELD, M.S., SUPERINTENDENT.

LETHBRIDGE, ALBERTA, March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa, Ont.

SIR,—I have the honour to submit the fifth annual report of the operations on the Experimental Station for Southern Alberta, at Lethbridge, for the year ending March 31, 1912. Four crops have now been grown since the establishment of the Station on the virgin prairie.

The season of 1911 has been a somewhat disappointing one for farming operations in Southern Alberta. The crops suffered for moisture in late May and early June and when the rains did begin they continued throughout the growing season and into the autumn. The precipitation during August and September was very much above the average, the result being that crops did not mature in a normal manner and the fall frosts, which came earlier than usual, injured a great deal of the grain. Some damage was also done by hail, the most destructive storm being the one that occurred on August 15. The path of the storm extended from a point west of the Macleod and Calgary branch of the Canadian Pacific Railway, near Granum, in a southeasterly direction to the international boundary, passing through the city of Lethbridge and destroying, in all, approximately one million bushels of grain. The weather during September, October and November was unfavourable for threshing, so that by the first of December there was but little over half of the threshing completed throughout the greater portion of the southern part of the province.

THE HAIL STORM.

The hail storm just referred to occurred on August 15 and took in on its course the greater portion of the Station. All grain on the west side, or non-irrigated part of the Station, was destroyed and such straw as was left standing had to be cut with the mowing machine for green feed. The main path of the storm in its southeasterly course did not extend to the east side of the Station so that grain standing there was not injured nearly so much. The yield on the irrigated portion was reduced by the hail probably twenty to twenty-five per cent, but it is very difficult to estimate. The damage to the different kinds of grain on the irrigated test plots varied, depending on the ripeness of the variety at the time of the storm, so that the relative standing of the varieties this year, so far as yield is concerned, cannot be relied on to any great extent. No grain at all from the non-irrigated portion of the Station was threshed except a small amount of winter wheat that was cut before the hail storm.

CHARACTER OF SEASON.

The winter of 1910-11 was, on the whole, an average one. The coldest weather experienced was during January, on the 12th of which month the lowest temperature of the winter was recorded, being –45·°. There was sleighing from January 11 to

February 7, it being rather exceptional in the Lethbridge district to have such a long period of unbroken sleighing. The spring of 1911, like that of 1910, opened early. We did the first work on the land at the Station on March 11, doing some harrowing in the afternoon of that day. In a week or ten days it was possible to plough. The last spring frost was on May 28 when 29·6° was recorded and the first frost in the autumn was on August 27 when 29·4° was registered.

The seeding was done in good season and, as the soil was in excellent shape, crops of all kinds came on rapidly and were in a most promising condition until the dry weather during the latter part of May and early in June. On account of the extremely dry season of 1910, all the moisture in the subsoil for several feet down had been exhausted by the time the rains of September of that year came. The result was that the soil was moist only to a depth of a foot to sixteen inches when the spring of 1911 opened up. This was the case on all the land no matter how it had been treated during the season of 1910, summer-fallowed land having no more moisture than land which had raised a crop that year. Favourable growing weather brought on the crops rapidly with the result that this small amount of moisture in the soil was soon exhausted. The dry weather during the latter part of May and early June was the cause of the crops in many districts in this part of the province suffering. This was particularly so in the case of winter wheat which up to this time had looked better than it had for two or three seasons previous but it began to feel the need of moisture almost at once owing to its advanced stage as compared with spring grain. In fact it began to head out prematurely before the rains of the latter part of June came. Spring grain, being less advanced in growth, had not used so much of the soil moisture and was little, if any, affected by the drought. During the rest of the summer, ample rain fell and spring grain came on in excellent condition, but the winter wheat, where it had suffered from the drought, never rallied and the yield was consequently light. It might be well to state, however, that this was not the case in all districts.

The unusually wet weather that prevailed during July and August was unfavourable for haying, the consequence being that there was a small proportion of No. 1 hay made. The hay crop is beginning to be of greater importance each year with us, now that the farmers on irrigated lands have begun to seed down more extensively with alfalfa and grasses.

Besides the unfavourable weather conditions for threshing, there was another feature about the autumn that was out of the ordinary and particularly unfortunate; this was the fact that the temperature dropped down to 9·7° on October 25 and continued to drop low for several successive nights, the result being that the ground froze and destroyed many thousands of bushels of potatoes that had not been dug in the southern part of the province. The early closing in of the winter also worked special hardship to the sugar beet growers in the Raymond district.

CUTWORMS.

Considerable damage from cutworms was reported from various districts in the southern part of the province. In a few special instances, the trouble has been serious but in the aggregate the loss from this source has not been great. However, it is serious enough so that it will pay farmers to be on the lookout for them in the grain fields as well as in the gardens. The cutworm is the larva of a moth. The larvæ are from one-half to three-fourths of an inch long and feed at night, coming up and cutting the young tender plants off at, or just below, the surface of the ground.

Remedies.—Mix one-half a pound of Paris green and fifty pounds of bran thoroughly together while still dry, then moisten very slightly with just enough water to make the mass flaky but not sticky. Too much stress cannot be laid on the importance of thoroughly mixing, for practically each particle of bran should be poisoned if

possible. Scatter this on the field where the pests are known to be present. This can be done on a reasonably large scale by distributing from a wagon, throwing it ten or fifteen feet on either side by means of a shingle or paddle.

TWO FARMS.

Of the 400 acres on the Station, one-fourth can be irrigated; the balance is devoted to 'dry' or non-irrigated farming. Two experimental farms are really being operated at Lethbridge. Their object is, not to compare the relative merits of the two systems, but to study their individual problems. To aid in doing this and to prevent confusion, the report is divided into two parts. Part I. deals with the results from the non-irrigated or 'dry' farm, and Part II. with the results from the irrigated farm. In this connection, it might be well to point out that the yields of even the same variety of crop grown on the two farms in any season are not necessarily comparable, and that an increased yield on the irrigated portion may not be entirely due to irrgiation, owing to the fact that the preparation of the land in the two fields may not have been identical; in fact no effort is made to make it so.

Although many of the tests carried out are the same on both the dry and the irrigated farms, still it would be well for the reader, if he wishes to get a comprehensive grasp of the work, to read both parts.

PART I.—THE NON-IRRIGATED OR 'DRY' FARM.

EXPERIMENTS WITH WINTER WHEAT.

The only grain that was cut on the Station before the hailstorm was the winter wheat. Although this was cut and in the stook, the storm came with such violence that the kernels in the heads, which had had time to become thoroughly dry, were badly threshed out so that there was considerable loss in hauling the bundles in to be threshed. It would be difficult to estimate closely this loss but it certainly was material. As has been stated, the winter wheat was seriously affected by the drought in May and early June.

WINTER WHEAT—TEST OF VARIETIES.

Twelve varieties of winter wheat were tested. They were all planted September 3, 1910, on summer-fallowed land, at the rate of about one bushel per acre. They made a good stand, wintered well and were in excellent condition in the spring, but the early drought and hail materially reduced the yields.

WINTER WHEAT.—(Non-Irrigated).—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.	
		1910	1911	Ins.		Ins.		Lbs.	Bush.	Lbs.
1	Turkey Red No. 380	Sept. 3	Aug. 3	27	9	$2\frac{3}{4}$	Bearded	1,680	38	20
2	Ghirka	" 3	" 2	28	7	3	Bald	1,560	36	17
3	New Kharkov No. 382	" 3	" 2	25	$7\frac{1}{2}$	$2\frac{1}{2}$	Bearded	2,220	36	..
4	Kharkov	" 3	" 3	24	$8\frac{1}{2}$	$2\frac{1}{2}$	"	2,640	35	52
5	Dawson's Golden Chaff	" 3	" 2	26	$9\frac{1}{2}$	3	Bald	2,520	35	38
6	Azima	" 3	" 2	24	7	$2\frac{1}{2}$	Bearded	2,820	33	4
7	Red Velvet Chaff	" 3	July 31	26	9	$3\frac{1}{4}$	"	2,520	31	..
8	Prosperity	" 3	Aug. 1	26	8	3	Bald	1,680	30	..
9	Reliable	" 3	" 3	32	8	$2\frac{3}{4}$	Bearded	1,680	30	..
10	Early Windsor	" 3	" 3	29	7	3	Bald	1,860	29	..
11	Abundance	" 3	" 3	26	8	$2\frac{1}{2}$	"	3,120	26	..
12	Red Chief	" 3	" 3	28	9	3	"	1,440	24	..

FIELD LOTS OF WINTER WHEAT.

There was only a small acreage of winter wheat grown this season on the Station.

Variety.	Area.	Date Ripe.	Date Cut.	Yield per Acre.	
	Acres.			Bush.	Lbs.
Ghirka	0.33	Aug. 5	Aug. 5	37	40
Azima	0.13	" 5	" 5	34	12
Kharkov	1.76	" 4	" 5	31	15

With reference to the above yields, it should be stated that the land on which the first two were sown was a field that had been summer-fallowed two seasons in succession and consequently was in better condition than was the field on which the Kharkov was sown, this being summer-fallowed during the summer of 1910 only.

There was also a field of several acres sown with winter wheat near the main irrigation canal but this was influenced in part by seepage from the ditch and so was only partly ripe and cut at the time the hail storm occurred, so that it was impossible to ascertain the yield.

CULTURE OF WINTER AND OF SPRING GRAIN.

In my last year's report, several pages are taken up in discussing this subject and some little space is devoted to such subjects as 'best time to sow winter wheat,' 'rates of seed per acre' both of winter and of spring wheats as well as oats and barley, including the average results of experiments along these lines for the three preceding years. Recommendations are also given as to the preparation of sod land, sowing on fresh breaking, backsetting, summer-fallowing, etc. On account of all our tests along this line being destroyed this season, there is nothing to add to last year's information in this report, but any one interested can obtain a copy of last year's report by applying to the Experimental Station, Lethbridge for the same.

CULTURAL WORK.

In order to determine the cultural methods which are of the greatest economic importance in reference to the conservation of soil moisture and the production of crops, five hundred and eight one-fortieth acre plots were set aside at this Station in the spring of 1911. Careful record is kept of the dates and number of times each plot is ploughed, packed, harrowed or disced and of the dates of seeding, harvesting and threshing. In conjunction with the latter, records of yields are taken. Besides these fundamental records, notes are taken on the condition of the soil and weather when the seed is sown. Meteorological observations week by week are also kept throughout the season and notes on all and every influence that might affect the crop's germination, growth, development, ripening, harvesting and threshing. The last-named data should prove invaluable in the way of accounting for any contradictory results that might be obtained from the same methods of treatment.

There are thirteen cultural experiments in operation on this Station at the present time and following is a brief outline of each one.

Experiment No. 1.—'Prairie Breaking'—Ploughing in the spring and sowing immediately with both grain and flax. Breaking different depths and at different times of the year.

Experiment No. 2.—'Depth of Ploughing'—Ploughing different depths from three to eight inches. Subsoiling is also done to a depth of four inches both with the three and eight-inch ploughing.

Experiment No. 3.—'Summer-fallow Treatment'—Ploughing at different depths and dates and twice in the same season. Rape on summer-fallow.

Experiment No. 4.—'Burning stubble in the fall and spring'—Ploughing in autumn, in spring and no ploughing, discing at cutting time and in the spring.

Experiment No. 5.—'Seeding to Grasses and Clovers'—Seeding with and without a nurse crop, on stubble, on summer-fallow and after hoed crops.

Experiment No. 6.—'Breaking Sod from Cultivated Grasses'—Somewhat similar to the test with 'Prairie Breaking.'

Experiment No. 7.—'Applying Barnyard Manure'—Applying on stubble, on summer-fallow, in fall, winter and spring.

Experiment No. 8.—'Green Manuring'—ploughing under green crops, peas and tares.

Experiment No. 9.—'Seed Bed Preparation'—Bad, good and extra good.

Experiment No. 10.—'Soil Packers'—Comparing different styles both for fall and spring use.

Experiment No. 11.—'Depth of Seeding'—From one to four inches.

Experiment No. 12.—'Commercial Fertilizers'—Nitrate, phosphate and potash separate and in combination with one another.

Experiment No. 13.—'Underdrainage'—Depth of three and four feet.

On account of the hail storm referred to, the crops were ruined on all of these plots. Such being the case, the only records we have from 1911 are the preparation of the land, seeding, cultivation of the crops, etc., together with the meteorological observations. Although the loss caused by the storm was very unfortunate still the season's work was not thrown away for in many of the experiments it was necessary to have special preparation given to the plot the previous season, such as having stubble land to treat in different ways, root ground on which to sow grain as compared to summer-fallow, etc., etc., all of which are ready for the season of 1912.

ROTATIONS.

The cultural work as just described is a line of investigation to determine the best methods to employ, such as when and how deep to plough, the best methods to follow in summer-fallowing, how to apply manure, etc., etc. The objects of the rotations are somewhat different, they being to determine, if possible, in what order crops should be grown to be not only most profitable but to maintain soil fertility.

Over 55 acres are devoted to the rotations. An acre to an acre and a half is used in each field. Rotations 'A,' 'B' and 'C' are used as a check, for nearly all the land in cultivation up to the present time in southern Alberta is farmed according to one or a combination of all of these rotations. The following is a list of the rotations ('U' and 'V' being on the irrigated portion of the Station, all the others on the non-irrigated part).

Rotation A.—Wheat continuously, year after year.

Rotation B.—First year summer-fallow, second year grain.

Rotation C.—First year summer-fallow, second year grain, third year grain.

Rotation T.—First year summer--fallow, second year wheat, third year oats or barley, fourth year summer--fallow to May, seeded to alfalfa in rows; fifth year alfalfa

hay, sixth year alfalfa hay, seventh year alfalfa hay or pasture, eighth year summer-fallow, ninth year hoed crop, tenth year wheat (manure).

Rotation M.—First year summer--fallow, second year wheat, third year coarse grain (manure), fourth year summer-fallow, fifth year peas and oats for hay, sixth year barley or oats.

Rotation S.—First year summer-fallow, second year hoed crop, third year wheat, fourth year summer-fallow, fifth year wheat, sixth year coarse grain, seventh year summer-fallow (manure), eighth year peas and oats for hay, ninth year rye pasture.

Rotation U.—First year seeding alfalfa, second year alfalfa hay, third year alfalfa hay, fourth year alfalfa hay, fifth year alfalfa hay, sixth year alfalfa hay, seventh year hoed crops, eighth year wheat, ninth year wheat or coarse grain, tenth year coarse grain.

Rotation V.—Alfalfa continuously.

OTHER CROPS.

As has been stated, all the spring grains on the non-irrigated portion of the Station were so badly damaged by the hail that they had to be cut for green feed. The peas were severely injured but there was some crop left. The corn was a sorry sight with the leaves shredded into narrow ribbons. The potato tops were pounded badly but, notwithstanding this the plants managed to produce a very creditable crop under the circumstances. The root crops managed to pull through and give a fair return.

The following results, although the yields are not high, illustrate very well the fact that the farmer who is following methods of diversified farming does not have as much to fear, even from a severe hail storm, as does a straight grain farmer, for it is well to bear in mind that these results are merely salvage, for the storm totally destroyed the grain crop.

Field Peas.—Test of Varieties.

In the case of the field peas, the hail pounded them well into the ground and injured the vines and nearly all of the pods but still left some crop to harvest. The results of the variety test are here given.

Twelve varieties of peas were grown. They were all sown on April 18 on summer-fallowed land in one-sixtieth-acre plots, at the rate of about two to two and one-half bushels per acre, depending on the size of the pea. They were in excellent condition up to the time of the hail storm.

Peas (Non-Irrigated)—Test of Varieties.

Number.	Name of Variety.	Date of Ripening.	Number of days Maturing.	Average Length of Straw.	Average Length of Pod.	Size of Pea.	Yield per Acre.	Yield per Acre.
				Ins.	Ins.		Lbs.	Bush. Lbs.
1	Prussian Blue	Aug. 30	134	36	2	Small	1,620	27 ....
2	Paragon	" 30	134	34	2	Medium	1,560	26 ....
3	Arthur	" 29	133	32	2	"	1,530	25 30
4	Golden Vine	" 30	134	34	2	Small	1,500	25 ....
5	Mackay	" 30	134	34	2	Large	1,470	24 30
6	Prince	" 30	134	34	2	"	1,440	24 ....
7	English Grey	" 30	134	40	2	Medium	1,410	23 30
8	Chancellor	" 30	134	36	2	Small	1,200	20 ..
9	Daniel O'Rourke	" 30	134	30	1¾	"	1,200	20 ....
10	Picton	" 30	134	36	1¾	Medium	1,140	19 ....
11	White Marrowfat	" 29	133	34	2	Large	1,140	19 ....
12	Black-Eye Marrowfat	" 30	134	36	1¾	"	1,020	17 ....

INDIAN CORN—Test of Varieties.

Seven varieties of corn were sown on summer-fallowed land in rows three feet apart on May 27. The crop was cut on September 7 and weighed while still green.

INDIAN CORN FOR ENSILAGE (NON-IRRIGATED)—Test of Varieties.

Number.	Name of Variety.	Average Height.	Condition when Cut.	Weight per Acre grown in Rows.		Weight per Acre grown in Hills.	
		Ins.		Tons.	Lbs.	Tons.	Lbs.
1	Angel of Midnight	58	Tasselled	25	270	8	1,490
2	Compton's Early	58	Well tasselled showing silk	17	760	11	.....
3	Eureka	55	Half tasselled no silk showing	17	650	9	260
4	Superior Fodder	52	Few tassels no silk	16	1,990	5	1,220
5	Selected Leaming	59	Few tassels some silk	14	1,260	8	1,160
6	Longfellow	54	Fairly tasselled some silk	14	50	8	1,490
	North Western Dent	54	Well tasselled small cobs	12	420	7	740

To get satisfactory results with corn, the land should be in a high state of cultivation. A liberal application of well-rotted stable manure is a great help and, to get the best results, it might be said to be a necessity. It is better, if possible, to have this applied the previous season, for it is essential to have it well incorporated with the soil.

Although it is difficult in an average season to have the crop sufficiently matured to make ensilage of high feeding value, still it is a crop that deserves more attention than is usually given it here, for it has a special value when used as a soiling crop. The farmer who is keeping milch cows will find a few acres of corn, well taken care of, a great aid in keeping up the milk supply during August and the early part of September, when the pastures are dry. By having the corn growing conveniently near his barn or corrall, he can cut some each day to feed at night without a great deal of extra labour and he will be certain to be more than pleased by the increased flow of milk.

TURNIPS.

Although turnips respond to good cultivation in that they delight in well-prepared land especially if an application of well-rotted manure has been given long enough before to allow it to be well worked into the land, still, they are a crop that often does wonderfully well on fresh-broken sod. This is a point that should be born in mind by the new homesteader who has nothing but sod land the first year.

TURNIPS—TEST OF VARIETIES.

Ten varieties of turnips were tested. They were planted on summer-fallowed land in rows thirty inches apart on May 27 and the plants were thinned to about one foot apart. The roots were pulled November 4.

TURNIPS (non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Size of Plot.	Sown.	Pulled.	Yield per Acre.	
		Acres.			Tons.	Lbs.
1	Magnum Bonum	1/145	May 27	Nov. 4	18	154
2	Hall's Westbury	1/99	" 27	" 4	17	1,734
3	Halewood's Bronze Top	1/108	" 27	" 4	17	967
4	Good Luck	1/108	" 27	" 4	17	97
5	Jumbo	1/132	" 27	" 4	15	1,416
6	Mammoth Clyde	1/171	" 27	" 4	15	1,260
7	Hartley's Bronze Top	1/99	" 27	" 4	15	1,205
8	Bangholm Selected	1/138	" 27	" 4	14	349
9	Carter's Elephant	1/129	" 27	" 4	12	134
10	Perfection Swede	1/89	" 27	" 4	6	151

MANGELS.

Eight varieties of mangels were tested. The seed was sown on summer-fallowed land on May 4 in rows thirty inches apart. The plants were thinned to about one foot apart. They were dug October 5.

MANGELS (non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Size of Plot.	Sown.	Pulled.	Yield per Acre.	
		Acres.			Tons.	Lbs.
1	Giant Yellow Intermediate	1/223	May 4	Oct. 5	18	1,528
2	Prize Mammoth Long Red	1/223	" 4	" 5	16	1,507
3	Yellow Intermediate	1/223	" 4	" 5	16	1,283
4	Giant Yellow Globe	1/223	" 4	" 5	16	837
5	Selected Yellow Globe	1/129	" 4	" 5	14	1,684
6	Perfection Mammoth Long Red	1/145	" 4	" 5	14	1,430
7	Gate Post	1/145	" 4	" 5	14	604
8	Half Sugar White	1/129	" 4	" 5	12	1,812

CARROTS.

Three varieties of carrots were tested. They were sown on summer-fallowed land on May 3 in rows twenty inches apart and the plants were thinned to about four to six inches apart. They were dug October 20.

CARROTS (non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Yield per Acre.	
		Tons.	Lbs.
1	White Belgian	13	1,545
2	Improved Short White	10	1,432
3	Ontario Champion	9	1,607

SUGAR BEETS.

Three varieties of sugar beets were tested. The seed was sown on summer-fallowed land on May 3 in rows twenty inches apart and the plants were thinned to about six to seven inches apart in the rows. They were dug October 20.

SUGAR BEETS (Non-irrigated)—Test of Varieties.

Number.	Name of Variety.	Size of Plot.	Sown.	Pulled.	Yield per Acre.	
		Acres.			Tons.	Lbs.
1	Klein Wanzleben	1/218	May 3	Oct. 20	12	829
2	Vilmorin's Improved	1/301	" 3	" 20	12	33
3	French Very Rich	1/218	" 3	" 20	9	1,820

POTATOES.—TEST OF VARIETIES.

Considering the severe pounding that the potato vines were subjected to by the hail storm, the yields obtained are somewhat remarkable. Eighteen varieties were tested. They were put in on summer-fallowed land. For planting, medium-sized potatoes were selected, the seed end was pared off and the potato was divided into four or six pieces depending on its size. They were planted on May 28 in rows thirty inches apart and the sets were placed about one foot apart in the rows. They were dug October 13.

POTATOES (Non-irrigated)—Test of Varieties.

Number.	Variety.	Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Ashleaf Kidney	426	48	396	..	30	48	Oval, white.
2	Carman No. 1	422	24	400	24	22	..	Flat, white.
3	Morgan Seedling	404	48	374	..	30	48	Long, pink.
4	American Wonder	393	48	374	..	19	48	Long, white.
5	Dreer's Standard	393	48	363	..	30	48	Oval, white.
6	Rochester Rose	385	..	343	12	41	48	Long, pink.
7	Factor	385	..	343	12	41	48	White.
8	Dalmeny Beauty	374	..	319	..	55	..	Oval, white.
9	Reeves' Rose	371	48	336	36	35	12	Long, pink.
10	Empire State	360	48	334	24	26	24	Long, white.
11	Irish Cobbler	356	24	330	..	26	24	Flat, white.
12	Gold Coin	356	24	319	..	37	24	Round, white.
13	Late Puritan	345	24	327	48	17	36	Long, pink.
14	Money Maker	327	48	316	48	11	..	Round, white.
15	Everett	325	36	301	24	24	12	Long, pink.
16	Vick's Extra Early	312	24	279	24	33	..	Flat, white.
17	Early Ohio	286	..	242	..	44	..	Pink.
18	Hard-to-Beat	244	12	222	12	22	..	White.

POTATOES FROM IRRIGATED LAND VS. SEED FROM NON-IRRIGATED LAND.

The question is often asked by the dry land farmer as to whether seed potatoes grown on dry land are not better for him to use than seed grown on irrigated land. To get information along this line, the following test was carried out.

Three rows, each 156 feet long, rows thirty inches apart, were planted with Gold Coin potatoes grown on non-irrigated land the previous season. Alongside, three more rows the same length were planted with seed grown on irrigated land the season previous.

	Total Yield per Acre.		Yield per Acre Marketable.	
	Bush.	Lbs.	Bush.	Lbs.
Seed from irrigated land	418	50	406	25
Seed from non-irrigated land	412	38	397	7

This test was repeated on irrigated portion of the Station but the results were reversed, that is, dry land seed when planted on irrigated land produced a larger crop than did seed from irrigated land planted on irrigated land.

POTATOES PLANTED AT DIFFERENT DISTANCES APART.

Potatoes were planted in rows 2½, 3, 3½ and 4 feet apart and the sets were put on one half the rows two feet apart and on the other half one foot apart. The following results were obtained:—

Distance Apart of Rows.	Amount of Seed per Acre.		Yield per Acre.									
			Sets put 2 feet Apart.					Sets put 1 foot Apart.				
			Yield 1911.				Average for 2 Years	Yield 1911.				Average for 2 Years
	Sets put 2 feet Apart.	Sets put 1 foot Apart.	Marketable.		Total.			Marketable.		Total.		
Feet.	Lbs.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush. Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush. Lbs.
2½	705	1,410	384	20	398	34	255 58	437	..	468	19	289 51
3	587	1,174	294	10	303	40	208 44	367	43	393	48	250 15
3½	503	1,006	264	20	270	26	187 17	366	..	386	20	238 22
4	440	880	237	32	245	32	170 13	358	32	367	26	229 38

A careful study of the above table indicates that when the sets are put two feet apart, a relatively larger return is obtained from the same amount of seed used than when the sets are put one foot apart, or expressed in another way, if one has a limited amount of seed, the sets should be placed farther apart in the row than one foot to get the best returns but, if one has a limited amount of land, a larger yield per acre can be obtained by putting the sets one foot apart rather than two feet.

FORAGE CROPS.

There is perhaps no work carried on at the Station that is watched with more interest by many of the farmers than the work with forage crops, particularly alfalfa. On the dry land, the hail storm unfortunately destroyed any results that we otherwise would have obtained.

Notwithstanding the very dry season of 1910, all of our alfalfa fields came through the winter and were, in the spring of 1911, in good, thrifty condition as were also some plots of western rye and brome grass. Timothy and clover, however, appeared to have succumbed on account of the unusually dry conditions during 1910.

As a result of the dry period mentioned above which prevailed during the latter part of May and the first part of June, the first cutting of alfalfa was very light and came into bloom when much of it was only a few inches high. This was cut as soon as the blooms appeared but the yields were in all cases less than one-half a ton to the acre. The rains during the latter part of June and during July brought the second growth on in excellent condition so that the second cutting would have been quite profitable had not the hail storm destroyed it.

The field of alfalfa planted in rows for the propagation of seed was loaded nicely and a fair crop of seed was looked for but this too was, of course, destroyed.

APPLE ORCHARD AND SMALL FRUITS.

The apple trees came through the winter in very good condition, there being but a relatively small amount of the previous season's growth killed back. There were no blooms, except in one or two isolated cases on the cross-bred apple trees, and no fruit set.

The currants and raspberries wintered well but there was practically no fruit on the currants and the raspberries produced but a small amount. The very dry season of 1910 was not conducive to a very vigorous growth. To carry raspberry canes through the winter, they must be protected by being laid down and covered with earth in late autumn.

PART II.—THE IRRIGATED FARM.

The crops on the irrigated portion of the Station were all more or less injured by the hail storm, but not nearly to the extent that they were on the non-irrigated portion, as only the outer fringe of the storm reached them.

SPRING WHEAT.—TEST OF VARIETIES.

Five varieties of spring wheat were tested. They were sown April 15 at the rate of one bushel and one peck per acre, on potato land, in plots of one-sixtieth acre each. They were irrigated once on June 23.

SPRING WHEAT—Test of Varieties (irrigated).

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Kind of Head.	Weight of Straw.	Yield per Acre.
					Ins.		Ins.		Lbs.	Bush. Lbs.
1	Huron	April 15	Sept. 1	139	46	10	3¼	Bearded.	3,473	55 45
2	Marquis	" 15	Aug. 31	138	42	10	3¼	Bald.	4,157	55 43
3	Red Fife	" 15	" 31	138	44	10	3	"	2,400	55 ..
4	Preston	" 15	" 31	138	46	10	3½	Bearded.	4,230	49 30
5	Stanley	" 15	" 31	138	48	10	3½	Bald.	4,995	44 45

RATES OF SEED PER ACRE.

In this experiment, Red Fife wheat was used in the four years that it has been carried on. The grain was sown this season, as has usually been the case in previous years, on summer-fallowed land. The grain was irrigated on June 23.

SPRING WHEAT—Rates of Seed per Acre (irrigated).

Rate of Seed per Acre.	Date Ripe.	Yield per Acre in 1911.		Average Yield for 4 Years.	
		Bush.	Lbs.	Bush.	Lbs.
15 lbs.	Sept. 9	28	..	28	30
30 "	" 9	50	40	34	44
45 "	" 9	51	40	36	23
60 "	" 1	51	..	36	50
75 "	" 1	52	20	40	5
90 "	Aug. 31	53	..	40	58
105 "	" 30	51	40	43	17
120 "	" 30	52	20	39	18

As will be noted from the column giving the average yields for four years, 105 pounds of seed per acre gives the largest yield. This is of importance to farmers on irrigated land in southern Alberta, for the usual practice is to sow much less than this amount.

FIELD LOTS OF SPRING WHEAT.

On rotation 'U,' the one-acre field yielded 26½ bushels of wheat. As this is the first year the rotation has been under way, the yield has no particular value. It might be of interest to note that the cost to produce this one acre including threshing and a charge of $3 for rent of land amounted to $11.12, leaving a profit of $12.73 per acre with wheat at 90 cents per bushel.

A field of 1·8 acres of Bobs wheat was grown on summer-fallowed land adjacent to the irrigated portion of the Station on land that had been summer-fallowed two seasons in succession, but the crop was not irrigated. It yielded at the rate of 36 bushels per acre.

EXPERIMENTS WITH OATS—TEST OF VARIETIES.

Five varieties of oats were tested. They were sown on April 17, at the rate of about eighty-five pounds per acre in one-sixtieth-acre plots on potato land. One irrigation was given on June 23.

OATS—Test of Varieties (irrigated).

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Weight of Straw.	Yield per Acre.	
				Ins.		Ins.	Lbs.	Bush.	Lbs.
1	Abundance	Aug. 25	130	46	9	7	5,220	90	..
2	Banner	" 24	129	46	10	7½	4,320	84	24
3	Danish Island	" 24	129	45	10	7½	4,320	84	24
4	Improved American	" 24	129	46	10	7½	4,260	82	32
5	Irish Victor	" 24	129	48	10	7½	4,080	79	14

From a four years' test, it would appear that Abundance and Banner stay at the top of the list with practically the same average yield, so that a farmer will make no mistake in using either one of these varieties.

OATS—RATES OF SEED PER ACRE.

The crop was sown on land on which potatoes were grown the previous season and was irrigated once on June 23.

OATS—Rates of Seed per Acre (irrigated).

Rate of Seed per Acre.	Date Ripe.	Yield per Acre in 1911.		Average Yield for 4 Years.	
		Bush.	Lbs.	Bush.	Lbs.
15 lbs.	Sept. 1	58	8	66	12
30 "	Aug. 30	80	20	70	23
45 "	" 30	88	8	72	27
60 "	" 30	93	18	79	21
75 "	" 30	92	12	81	15
90 "	" 30	95	30	84	33
105 "	" 25	80		82	7
120 "	" 24	76	16	78	13

The average results for four years indicate that 90 pounds of seed per acre, or about 2¾ bushels, is not far from the best quantity of oats to sow on irrigated land.

FIELD LOTS OF OATS.

There were two acres of oats in rotation 'U' that yielded at the rate of 55 bushels per acre. The cost per acre to produce the crop, including threshing and $3 per acre for rent, was $11.36 per acre.

A field of 13·02 acres was sown on summer-fallowed land. It received one irrigation and yielded at the rate of 80 bushels and 19 pounds per acre.

EXPERIMENTS WITH BARLEY.

Six varieties of six-row and four varieties of two-row barley were tested. They were sown on potato land on one-sixtieth-acre plots on May 1 and 2, at the rate of about 85 pounds per acre. One irrigation was given on June 23. As the varieties were all about ripe at the time of the hail storm, they were naturally injured a good deal thereby.

SIX-ROWED BARLEY—Test of Varieties (irrigated).

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Weight of Straw.	Yield per Acre.	
				In.		In.	Lbs.	Bush.	Lbs.
1	Claude	Aug. 16	107	36	8	2½	3,180	81	12
2	O. A. C. No. 21	" 17	107	39	9	2⅝	5,760	73	36
3	Odessa	" 23	114	35	6	2½	2,880	65	..
4	Mansfield	" 16	107	37	9	2½	2,940	61	12
5	Mensury	" 23	114	38	8	2¾	2,940	51	12
6	Manchurian	" 23	113	45	7	3	3,730	41	43

TWO-ROWED BARLEY—Test of Varieties (irrigated).

Number.	Name of Variety.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a Scale of 10 Points.	Average Length of Head.	Weight of Straw.	Yield per Acre.	
				In		In	Lbs.	Bush.	Lbs.
1	Swedish Chevalier	Aug. 23..	114	36	2	3	4,920	70	..
2	Standwell	" 23..	114	36	4	2½	4,620	63	36
3	Invincible	" 23..	114	38	5	2¾	4,680	62	24
4	Clifford	" 18..	109	46	10	3½	6,300	41	12

BARLEY—RATES OF SEED PER ACRE.

Mensury barley was used and it was sown April 21, on potato ground. One irrigation was given on June 23. There was a severe wind storm soon after this barley came up that blew sand across the field and cut nearly all the small plants off close to the ground so that maturity was doubtless delayed and the yield reduced somewhat.

BARLEY—Rates of Seed per Acre (irrigated).

Rate of Seed per Acre.	Date Ripe.	Yield in 1911.		Average Yield for 4 Years.	
		Bush.	Lbs.	Bush.	Lbs.
15 lbs.	Aug. 23..	24	8	32	14
30 "	" 16..	50	..	40	30
45 "	" 15..	51	12	44	8
60 "	" 15..	56	12	46	42
75 "	" 15..	47	44	41	26
90 "	" 15..	55	..	42	32
105 "	" 15..	38	36	34	42
120 "	" 15..	37	4	36	47

As in the case of oats, 90 pounds of seed per acre has given the best returns for the last four years.

EXPERIMENTS WITH PEAS—TEST OF VARIETIES.

Twelve varieties of peas were tested. They were sown in one-sixtieth-acre plots, on summer-fallowed land, on April 17, at the rate of about two to two and one-half bushels per acre, deepening on the size of the pea. They were given one irrigation on June 23.

PEAS.—Test of Varieties—(Irrigated).

Number.	Name of Variety.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Size of Pea.	Yield per Acre.	Yield per Acre.
				Inches.	Inches.		Lbs.	Bush. Lbs.
1	Paragon	Aug. 31..	136	48	2¼	Large	3,000	50 ..
2	Prince	" 31..	136	48	2	"	2,760	46 .
3	Prussian Blue	" 31..	136	44	2¼	Medium	2,760	46 ..
4	English Grey	" 31..	136	48	2	"	2,640	44 ..
5	Mackay	" 31..	136	46	2	"	2,640	44 ..
6	Picton	" 31..	136	48	2¼	Large	2,325	38 45
7	Black-Eye Marrowfat	" 31..	136	48	2½	"	2,280	38 ..
8	Arthur	" 31..	136	42	2	Medium	2,220	37 ..
9	Chancellor	" 29..	134	46	2	"	2,160	36 ..
10	Golden Vine	" 31..	136	43	2	Small	2,040	34 ..
11	White Marrowfat	" 31..	136	54	2¼	Large	2,040	34 ..
12	Daniel O'Rourke	" 31..	136	48	2	Small	1,500	25 ..

EXPERIMENTS WITH INDIAN CORN—TEST OF VARIETIES.

Seven varieties of corn were sown for ensilage in rows three feet apart on May 27. In each case, part was planted in hills three feet apart and part in rows, the plants being thinned out to about ten inches apart in the rows. The crop was cut on September 7 and weighed while still green. It was irrigated once on July 24.

INDIAN CORN FOR ENSILAGE—Test of Varieties (irrigated).

Number.	Name of Variety.	Average Height.	Condition when Cut.	Weight per Acre Grown in Rows.		Weight per Acre Grown in Hills.	
		In.		Tons.	Lbs.	Tons.	Lbs.
1	Superior Fodder	59	No tassels	21	....	10	1,280
2	Selected Leaming	67	Just tasselling, no silk	17	560	12	1,600
3	Angel of Midnight	71	Tasselled, large per cent. of silk.	17	560	11	1,560
4	Eureka	65	Few tassels	16	1,920	10	1,840
5	Longfellow	60	Some tasselled, some silk	15	800	8	160
6	Northwestern Dent	61	Some cobs	13	.. .	8	720
7	Compton's Early	70	Tasselled, few silks	12	720	9	1,520

As mentioned earlier in this report, corn is a crop of a great deal of value to the dairy farmer, for it gives him something of a green, succulent nature to cut and feed to his cows during August and September at a time when his milk supply will fall off rapidly unless he does something of this kind.

FIELD ROOTS.

Too little attention is being paid to the growing of roots for stock feed by the farmers on irrigated land in Southern Alberta. On account of our short growing season, it is always going to be difficult to get a variety of corn that will produce a large quantity of fodder sufficiently matured to make good ensilage, but our climate and soil are peculiarly adapted to the growing of roots and these, when fed in conjunction with alfalfa hay, make an ideal food for milch cows or for the growing and fattening of stock of all kinds.

Preparation of the land.—The land on which the varietal tests were conducted had been in potatoes the year previous. The field was ploughed in the spring and packed. All of the roots were irrigated but once, on July 24.

EXPERIMENTS WITH TURNIPS—TEST OF VARIETIES.

Ten varieties of turnips were tested. They were planted in rows thirty inches apart, on May 27, and the plants were thinned to about one foot apart. The roots were pulled November 4.

TURNIPS (irrigated)—Test of Varieties.

Number.	Name of Variety.	Size of Plot.	Pulled.	Yield per Acre.	
		Acres.		Tons.	Lbs.
1	Hall's Westbury	1/100	November 4....	26	..
2	Halewood's Bronze Top	1/100	" 4 ...	24	500
3	Mammoth Clyde	1/100	" 4....	24	....
4	Bangholm Selected	1/124	" 4 ...	23	1,917
5	Good Luck	1/100	" 4....	22	1,500
6	Magnum Bonum	1/100	" 4....	22	1,500
7	Hartley's Bronze Top	1/100	" 4....	21	500
8	Perfection Swede	1/100	" 4....	20	1,500
9	Jumbo	1/100	" 4....	19	1,000
10	Carter's Elephant	1/100	" 4...	19	500

EXPERIMENTS WITH MANGELS—TEST OF VARIETIES.

Eight varieties of mangels were tested. The seed was sown May 2 and again on May 17 in rows thirty inches apart. The plants were thinned to about one foot apart. They were dug October 4.

MANGELS (irrigated)—Test of Varieties.

Number.	Name of Variety.	Size of Plot.	Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.	
		Acres.	Tons.	Lbs.	Tons.	Lbs.
1	Giant Yellow Globe	1/100	22	700	18	...
2	Perfection Mammoth Long Red	1/100	22	350	19	1,500
3	Selected Yellow Globe	1/100	21	1,800	19	1,600
4	Prize Mammoth Long Red	1/100	21	700	17	1,700
5	Giant Yellow Intermediate	1/100	19	1,600	14	1,700
6	Half Sugar White	1/100	19	900	18	1,100
7	Gate Post	1/100	18	800	18	300
8	Yellow Intermediate	1/100	17	1,000	16	1,200

EXPERIMENTS WITH CARROTS—TEST OF VARIETIES.

Five varieties of carrots were tested. They were sown May 2 in rows twenty inches apart and the plants were thinned to about four to six inches apart. They were dug October 20.

CARROTS (irrigated)—Test of Varieties.

Number.	Name of Variety.	Yield per Acre.	
		Tons.	Lbs.
1	White Belgian	22	1,293
2	Half Long Chantenay	20	540
3	Ontario Champion	19	1,947
4	Mammoth White Intermediate	19	1,947
5	Half Short White	13	730

EXPERIMENTS WITH SUGAR BEETS—TEST OF VARIETIES.

Three varieties of sugar beets were tested. The seed was sown May 2 in rows twenty inches apart and the plants were thinned to about six to seven inches apart in the rows. They were dug October 20.

SUGAR BEETS (irrigated)—Test of Varieties.

Number.	Name of Variety.	Size of Plot.	Sown.	Pulled.	Yield per Acre.	
		Acres.			Tons.	Lbs.
1	Vilmorin's Improved	1 148	May 2	Oct. 20	20	837
2	Klein Wanzleben	1 148	" 2	" 20	15	1,631
3	French Very Rich	1 148	" 2	" 20	13	1,473

EXPERIMENTS WITH POTATOES.

The season proved to be a favourable one for potatoes and the hail storm did not appear to affect the yield materially. Some general observations in regard to the culture of potatoes on irrigated land with special reference to their irrigation were given in last year's report, so that it will not be necessary to repeat anything of a similar nature here.

TEST OF VARIETIES.

Eighteen varieties were tested. They were all planted on May 25 in rows thirty inches apart and the sets were planted about one foot apart in the row. The seed was cut the same as in the non-irrigated test. They were irrigated twice on July 24 and July 29.

POTATOES (irrigated)—Test of Varieties.

Number.	Variety.	Yield per Acre.		Yield per Acre Marketable.		Yield per Acre Unmarketable.		Form and Colour.
		Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
1	Gold Coin	568	20	546	40	21	40	Round, white.
2	Irish Cobbler	560	..	528	20	31	40	Flat, white.
3	Morgan Seedling	533	20	510	..	23	20	Long, pink.
4	Empire State	518	20	501	40	16	40	Long, white.
5	Carman No. 1	483	20	468	20	15	..	Flat, white.
6	Dalmeny Beauty	483	20	456	40	26	40	Oval, white.
7	Rochester Rose	471	40	441	40	30	..	Long, pink.
8	American Wonder	459	48	444	24	15	24	Long, white.
9	Reeves' Rose	455	..	416	40	38	20	Long, pink.
10	Dreer's Standard	428	20	405	..	23	20	Oval, white.
11	Everett	423	20	381	40	41	40	Long, pink.
12	Late Puritan	420	..	400	..	20	..	" "
13	Vick's Extra Early	400	..	383	20	16	40	Flat, white.
14	Ashleaf Kidney	396	40	373	20	23	20	Oval, white.
15	Factor	383	20	355	..	28	20	White.
16	Money Maker	366	40	353	20	13	20	Round, white.
17	Early Ohio	361	40	336	40	25	..	Pink.
18	Hard-to-Beat	240	..	223	20	16	40	White.

FIELD LOTS OF POTATOES.

An acre of potatoes was grown in rotation 'U' and, although this is the first year that the rotation has been under way, the results obtained are of sufficient interest to be worth reporting.

Nine and a half tons of manure was applied in the spring and ploughed under. The potatoes were planted May 26. As we did not have a sufficient quantity of seed of any one variety, four kinds were planted, namely, Irish Cobbler, Early Ohio, Rochester Rose and Gold Coin. A horse cultivator was used four times during the summer. They were irrigated once on July 25.

The total cost of producing the crop, including a charge of $3 for rent, amounted to $52.79; the total value of the crop at $23 per ton, which was the wholesale price in November, was $314.18, leaving a net profit of $261.39.

POTATOES FROM IRRIGATED LAND VS. SEED FROM NON-IRRIGATED LAND.

	Total Yield per Acre.		Yield per Acre Marketable.	
	Bush.	Lbs.	Bush.	Lbs.
Seed from non-irrigated land	587	53	564	33
Seed from irrigated land	457	52	430	5

FORAGE CROPS.

ALFALFA—IRRIGATED.

Of all the crops that can be profitably grown on irrigated land in Southern Alberta there is none that is of greater importance than alfalfa. Alfalfa-growing is no longer in the experimental stage here. It has been now grown in the Lethbridge district for eleven years and there is at the present time about 6,000 acres seeded down. No winter-killing worth mentioning has been reported in the district. In other portions of the southern part of the province, there have been a large number of experimental fields put in which have in most cases been successful. Indications, however, point to the fact that care must be exercised in the selection of the seed. The Grimm is probably the hardiest variety found so far, but pure seed of this strain is difficult to obtain. The Turkestan is also a good variety. Seed grown in the northern part of Montana will probably prove quite satisfactory. It is to be hoped that it will be found possible to grow seed commercially in the province so that in time the local demand may be supplied, in part at least, in this way.

A bulletin dealing with alfalfa growing in Alberta has been prepared by Mr. G. H. Hutton, Superintendent, Experimental Station, Lacombe, and the writer of this report. A copy of it may be had by applying to the Experimental Station either here or at Lacombe, Alta.

The yields obtained this year have been the lightest since the Station was established. There are two reasons; there was a light hail storm in June just before the first cutting was made that injured the crop somewhat by breaking some of the slender growth off and there was more rain than is ordinarily the case in July and August. The weather during this period was cooler than usual, consequently the growth of the alfalfa was not as rank as it would otherwise have been.

ALFALFA—RATES OF SEED PER ACRE.

In the spring of 1908, plots of one-fourth acre each were planted with alfalfa and the yields of these during 1911 are here given as well as the average yield for the past three years. It should be stated that the weather conditions were favourable at the time these plots were planted and an excellent stand was obtained, in fact, better than one could ordinarily count on, consequently the good yields from the light seeding.

ALFALFA—Rates of Seed per Acre (irrigated).

Rate of Seed.	First Cutting.				Second Cutting.				Third Cutting.				Total for Season.			
	Yield in 1911.		Average for 3 Years.		Yield in 1911.		Average for 3 Years.		Yield in 1911.		Average for 3 Years.		Yield in 1911.		Average for 3 Years.	
Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
5	1	1,000	1	1,520	1	1,720	2	347	–	1,920	1	406	4	640	5	273
10	1	860	1	1,913	2	60	2	727	–	1,980	1	793	4	900	5	1,333
15	1	680	1	1,986	2	40	2	647	–	1,800	1	793	4	520	5	1,426
20	1	620	1	1,846	2	200	2	747	–	1,820	1	627	4	640	5	1,220
25	1	560	1	1,640	1	1,960	2	613	–	1,705	1	622	4	225	5	875
30	1	960	1	1,920	2	300	2	713	–	1,680	1	760	4	940	5	1,394

FIELD LOTS OF ALFALFA (irrigated).

Area.	First Cutting.		Second Cutting.		Third Cutting.		Total Yield per Acre.	
	Date Cut.	Yield per Acre.	Date Cut.	Yield per Acre.	Date Cut.	Yield per Acre.		
Acres.		Tons Lbs.		Tons Lbs.		Tons Lbs.	Tons	Lbs.
2.8	June 19	1 660	August 12	1 1,815	Sept. 27	.. 1,275	3	1,750
3⅓	" 19	1 1,165	" 14	1 1,877	" 28	.. 1,019	4	61
0·89	" 29	2 1,034	" 11	1 1,753	" 27	.. 1,286	5	73

MIXTURE OF GRASSES AND ALFALFA.

Where alfalfa is sown with a mixture of grasses such as timothy, rye grass, etc., the hay can be cut only twice during the season instead of three times, owing to the fact that the grasses are not ready to cut until some time in July, which allows time for only one more cutting to come on, while alfalfa, when grown alone, must be cut the first time about June 25 if three cuttings are desired. After the grasses have been cut in July, they make little growth, so that the second cutting is practically pure alfalfa. The following table gives the results of four plots of one-quarter of an acre each, sown in 1908, and also one field of 5·3 acres of alfalfa and timothy sown in 1910.

MIXTURES OF GRASSES AND ALFALFA.

	First Cutting.				Second Cutting.				Total for Season.			
	Yield in 1911.		Average for Three Years.		Yield in 1911.		Average for Three Years.		Yield in 1911.		Average for Three Years.	
	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
Alfalfa and brome grass	1	1,720	2	1,200*	1	1,120	2	480*	3	840	4	1,680*
Alfalfa and timothy	2	1,120	2	1,207	1	880	1	1,733	4	..	4	940
Alfalfa and rye grass	2	160	2	1,253	1	1,320	2	293	3	1,480	4	1,546
Alfalfa, brome, timothy and rye grass	2	580	2	1,467	1	1,200	2	506	3	1,780	4	1,973
Alfalfa and timothy	1	1,905	..	..	1	240	..	..	3	145	..	..

* Average yield per acre for two years only.

VARIETIES OF ALFALFA.

In the spring of 1909, seed of fourteen varieties or strains of alfalfa were planted that were received from the United States Department of Agriculture, Washington, D.C. These were supplied by the courtesy of Mr. J. M. Westgate, Agronomist, Division of Forage Crop Investigations. The following table gives the results for the past season:—

Size of Plot.	Name and Number.	First Cutting.		Second Cutting.		Third Cutting.		Total for Season.	
		Yield per acre.		Yield per acre.		Yield per acre.		Yield per acre.	
Acres		Tons	Lbs.	Tons	Lbs.	Tons	Lbs.	Tons	Lbs.
1·10	25102 Grimm	2	950	2	750	..	1,400	5	1,100
1·10	21032 Turkestan	2	750	2	150	..	1,380	5	280
1·10	23454 Montana	2	1.650	2	550	..	1,670	5	1,870
1·10	23396 Sand Lucerne	2	850	1	1,850	..	1,580	5	280
1·10	23394 Sand Lucerne	2	1,150	2	400	1	100	5	1,650
1·10	24836 Canadian (Purple Flowers)	2	600	2	150	..	1,800	5	550
1·10	24859 Kansas Hardy	3	400	2	1,550	..	1,980	6	1,930
1·10	24837 Canadian (Variegated)	2	1,450	2	1,700	..	1,940	6	1,090
1·10	Turkestan from Ottawa	3	1,000	2	400	..	1,000	6	400
1·40	25022 Old Frankish Lucerne	2	1,000	1	1,280	..	1,760	5	40
1·40	22789 From Tschimkent, Turkestan (Average winters)	2	1,000	2	880		1,160	5	1,040
1·40	22790 From Khiva, Turkestan, (Mild winters)	2	1,600	2	.....		1,240	5	840
1·40	23203 From Werny, Turkestan, (Very severe winters)	3	.....	2	1,400		1,240	6	640
1·40	22788 From Aulieata, Turkestan, (Severe winters)	3	.....	1	1,800		1,240	5	1,040

NEW SEEDING.

There was about eight acres more land seeded down to alfalfa in 1911.

TIMOTHY AND CLOVER.

A field of a little less than one acre (0·96) was sown in 1910. It was irrigated twice during the summer.

——	Date Cut.	Yield per Acre.	
		Tons	Lbs.
First Cutting	July 10	1	1,820
Second Cutting	Sept. 9	1	1,415
Total for season		3	1,235

TIMOTHY.

A field of one-quarter of an acre of timothy was cut July 13 and yielded at the rate of 2 tons and 600 pounds per acre. A second growth came on which was cut on August 14 but only yielded at the rate of 920 pounds per acre.

BROME GRASS *(Bromus inermis).*

A field of one-half acre of this hay was sown in 1908. It was cut this year on July 10 and yielded at the rate of 2 tons and 70 pounds per acre. Some second growth came on but was not cut.

WESTERN RYE GRASS *(Agropyrum tenerum).*

A field of one-half an acre of this hay was cut July 13 and yielded at the rate of 2 tons and 460 pounds per acre.

SHEEP FEEDING EXPERIMENT.

A feeding experiment was inaugurated with wether lambs for the purpose of gaining information on the relative values of alfalfa when fed alone and in different combinations with roots and grains and also to try to provide a market for alfalfa which would prove to be more profitable to the farmer than pressing and shipping it, and lastly to determine whether or not it be possible to carry the surplus stock from the fall through the winter with a profit till such time as the market price for mutton is firmer and higher than in the fall months.

OUTLINE OF EXPERIMENT.

Two hundred and fifty wether range lambs were purchased in October for $3 per head for tops, from Mr. Jos. A. Young, of Lethbridge. These lambs were delivered at the Station before the end of October and were run on the stubble until November 20, at which time they were brought in and divided into five lots of 50 each and put into yards 100 feet by 25 feet with sheds at the end of each, 12 feet by 25 feet. The different manner in which the five lots were fed is as follows:—

Group 1.—Alfalfa and mixed grains.
Group 2.—Alfalfa and screenings.
Group 3.—Alfalfa, roots and mixed grains.
Group 4.—Alfalfa and roots.
Group 5.—Alfalfa alone.

Lots four and five to be fed mixed grains for the last five or six weeks of the experiment to finish and harden them sufficiently for shipping. For two weeks after being shut in these yards, each lot received hay only.

In lots 1 and 3 it was planned at first to work the amount of meal up gradually until a pound per lamb per day was reached, but this idea was abandoned soon after starting the experiment, and it was decided that they should be gradually worked up to whatever they would eat up clean, which proved to be approximately two pounds per lamb per day. On account of having only a limited amount of roots, the lambs never got more than three pounds each per day and usually about two pounds. The bunch fed screenings were given all they would eat up which was something less than two pounds per lamb per day. The groups getting meal and roots would take fully as much meal as the group that got only meal.

TABLE SHOWING AMOUNT OF FEED CONSUMED.

—	Lot 1.	Lot 2.	Lot 3.	Lot 4.	Lot 5.
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
Total amount of hay consumed	11,959	12,204	11,599	13,209	13,714
Average amount of hay consumed per lot per day	106	109	103	118	122
Average amount of hay consumed per lamb per day	2·16	2·18	2·10	2·40	2·49
Total amount of meal eaten by lot for period	6,062		6,062	2,200	2,200
Average amount of meal eaten per lot per day	54		54	*52	*52
Average amount of meal eaten per lamb per day	1·10		1·10	*1·06	*1·06
Total amount of screenings eaten by lot for period		5,082			
Average amount of screenings eaten by lot per day		45			
Average amount of screenings eaten per lamb p. day		·9			
Total amount of roots eaten by lot for period			9,985	9,985	
Average amount of roots eaten by lot per day			89	89	
Average amount of roots eaten per lamb per day			1.81	1·81	

* Fed meal during the last six weeks only.

Water was kept before them regularly throughout the day. The two hundred and fifty sheep on an average consumed fifty pails of water per day. A supply of rock salt was kept in each yard. Care was exercised in keeping the pens dry and the floors well covered with straw to insure thorough comfort for the sheep.

FEEDS.

In calculating the cost of feeding, the following prices were charged:—

—	Price per Ton.
Roots (Turnips)	$ 2 50
Meal mixture (2 oats, 2 wheat, and 1 bran)	20 00
Alfalfa hay	10 00
Screenings	5 00

The meal mixture was made up of two parts of oats (ground), two parts of injured wheat and one part of bran. The screenings are valued at $5 per ton which is rather high for the average elevator screenings but it was not too high for the grade we fed, taking them all through. In feeding screenings, it is advisable to buy the full quantity that will probably be required to put the stock through that are being fed, so that the animals receive feed from day to day of a quality that is uniform. This they do not do in cases where screenings of varying quality are fed, as they come from the elevator from time to time.

TABLE OF WEIGHTS AND GAINS.

Date of Weighing.	Lot 1		Lot 2		Lot 3		Lot 4		Lot 5	
	Total Weight by lot	Gain per lamb per day	Total Weight by lot	Gain per lamb per day	Total Weight by lot	Gain per lamb per day	Total Weight by lot	Gain per lamb per day	Total Weight by lot	Gain per lamb per day
	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.	Lbs.
November 21, 1911	3,969	.....	3,923	.....	3,907	.....	3,928	.....	3,967	.....
December 5, 1911	4,080	·16	4,091	·24	4,125	·31	4,197	·38	4,036	·09
December 19, 1911	4,180	·14	4,175	·12	4,211	·12	*4,145	·04	4,087	·58
December 26, 1911	4,537	1·02	4,544	1·05	4,586	1·07	4,334	·55	4,390	·86
January 17, 1912	4,565	·03	4,530	—·01	4,720	·13	4,345	·01	4,322	—·66
January 30, 1912	4,650	·12	4,670	·2	4,905	·26	4,310	—·05	4,090	—·33
February 13, 1912	*4,930	·54	4,835	·23	5,192	·41	4,600	·42	*4,370	·52
February 27, 1912	5,120	·27	4,955	·17	5,485	·42	4,945	·5	4,610	·35
March 12, 1912	5,491	·54	5,089	·19	*5.633	·37	5,311	·53	5,076	·68
Average	.....	·291	.....	·208	.....	·328	.....	·266	.....	·216

* One lamb died before this weighing.

GENERAL STATEMENT.

—		Lot 1.	Lot 2.	Lot 3.	Lot 4.	Lot 5.
Number of lambs in lot at beginning of period		50	50	50	50	50
Number of lambs in lot at end of period		49	50	49	49	49
Number of days in experiment		112	112	112	112	112
Total weight at beginning of experiment		3,969	3,923	3,907	3,928	3,967
Average weight per head at beginning of period		79·38	78·46	78·14	78·56	79 34
Total weight at beginning of experiment after deducting weight of loss above		3,890	.....	3,829	3,850	3,888
Total weight at end of experiment	Lbs.	5,491	5,089	5,633	5,311	5,076
Gain per period	"	1,601	1,166	1,804	1,461	1,188
Gain per head per period	"	32·07	23 32	36·81	29·81	24·24
Gain per head per day	"	·291	·208	328	·266	216
Quantity of meal eaten by lot for period	"	6,062	.....	6,062	2,200	2,200
Quantity of screenings eaten by lot for period	"	.....	5,082	.....	.....	.....
Amount of alfalfa hay eaten by lot for period	"	11,959	12,204	11,599	13,209	13,714
Quantity of roots eaten by lot for period	"	.....	.....	9,985	9,985	.....
Total cost of feed	$	120·42	73·72	131·10	100·52	90·57
Cost of the amount eaten by the 49 or 50	"	119·02	73·72	128·80	99·52	89·47
Cost of feed per head for period	"	2·43	1·47	2·62	2·04	1·82
Cost of feed per head per day	cts.	2·16	1·31	2·34	1·82	1·62
Cost to produce one pound gain	"	7·43	6·32	7·13	6 84	7·53
Original cost of sheep @ 3.80c. per pound live weight	$	147·82	149·07	145·50	146·30	147·74
Original cost of sheep plus cost of feed	"	266·84	222·79	274·30	246·82	237·21
Sold at 6.25c. per pound live weight less 5% shrink	"	326·03	302·16	334·46	315·34	301·39
Net profit on lot	"	59·19	79·37	60·16	68·52	64·18
Net profit per lamb	"	1·20	1·58	1·23	1·42	1·31

There were four lambs died during the feeding experiment, three of indigestion and one of some other cause. The groups these died from were not charged with the loss, instead we deducted it from the total profit of all the sheep.

DEDUCTIONS FROM THE EXPERIMENT.

Group 2 has shown the greatest profit. It will be noted that it received a ration composed of alfalfa, hay and screenings. This group had the others at a disadvantage in so far as it got the benefit of their better finish on the market being sold with them. Group No. 4 shows the second largest profit and these lambs were very fair in appearance. Group No. 5 stood third in the way of producing profit. The finish of the lambs in this group was relatively poor and it might be mentioned that they appeared to notice the severe weather more than did the other lots. The lambs in group 3 were a pleasure to look at and they certainly helped market the poorer lots. The profits from this bunch, as will be noted from the table, are very satisfactory, even if they have to take fourth place in this respect. Group No. 1 was fifth in rank but the lambs were of excellent quality.

The price obtained per ton for the alfalfa hay fed to the different groups, not considering labour, was:—

Group No. 1	$19 93	per ton.
Group No. 2	23 00	"
Group No. 3	20 37	"
Group No. 4	20 37	"
Group No. 5	19 36	"
Average	$20 61	"

SUMMARY.

First weight of the five lots, 250 lambs	lbs.	19,694
First weight of lambs that died (four)	"	314
First Weight of lambs after deducting loss	"	19,380
Average weight of lambs at beginning of experiment	"	78·77
Average rate of gain per sheep per day	"	·262
Final weight of the five lots	"	26,600
Average weight per lamb at finish	"	108·13
Total gain in period	"	7,220
Cost of feeding 246 lambs 112 days	$	511 03
Cost of one (1) pound gain for whole lot	lbs.	7·07
Total profit less labour, salt and interest on investment.	$	318 35
Loss of the feed eaten by the four (4) sheep that died.	"	5 30
Cost of sale	"	1 50
Labour for bunch	"	62 50
Interest on money invested	"	19 75
Total net profit on the five lots	"	229 30
Total net profit per head	"	0 93

FINANCIAL STATEMENT.

Cost of 250 lambs	$	750 00
Cost of feed		516 43
Cost of salt		1 50
Cost of labour (estimated)		62 50
Interest on investment		19 75
Selling price	$1,579 38	
Net profit		229 30
	$1,579 38	$1,579 38

The total or gross profit from all the sheep was $311.55. In considering this from a business standpoint, $19.75 must be charged for interest, at 8 per cent. on the money tied up in these lambs for the four months, and also the cost of labour for looking after them during the same period. The actual cost of our labour in carrying out the experiment is much greater than it would have been if it had been carried out in a purely commercial manner. Mr. H. A. Suggitt, of Coaldale, and Mr. S. C. Cress, of Lethbridge, have fed sheep somewhat extensively and they both state that one man can feed and attend to 1,000 sheep without any difficulty. On this basis, allowing $50 per month for the man, it would cost $250 to feed one thousand sheep for five months, or $62.50 to feed two hundred and fifty head for the same period. This $62.50 for labour and the interest on investment, $19.75, reduces the net profit to $229.30 or a profit of 93 cents per lamb.

SALE.

Shortly before the end of the feeding period, letters were written to some of the leading buyers in the province, inviting them to bid for the carload, which resulted in our receiving a number of offers for the bunch. Mr. G. Jack, of the Swift Canadian Company, Edmonton, submitted the highest bid from any outside source and accordingly the sheep were sold to that company for 6¼ cents per pound live weight at the stock-yards at Lethbridge, less 5 per cent shrinkage. The following is a copy of a letter received from this company shortly after the sheep were sold:—

'Your letter of March 29 received this morning. I intended writing you a few days ago about the shrink on these lambs but was out in the country at the time.

The lambs killed out very well and figured 54½ per cent, which is extra good for lambs of that kind. In shipping these lambs, we should have clipped them, as I lost a few on the road coming up on account of having them too heavily loaded. These lambs shrunk 8 lbs. per head from the weights I paid you for, at Edmonton. The beef man there was very well pleased with the quality of these lambs and they suit our trade very well.

'For your information.

'Yours respectfully,

'(Signed) SWIFT CANADIAN CO., LTD.,
'Per G. JACK.'

ORCHARDS AND SMALL FRUITS.

Most of the apple trees wintered with but small amount of winter-killing. No. blooms were formed. The currants came through the winter in excellent condition but spring frosts injured the fruit buds so that no fruit was obtained.

RASPBERRIES.

The results from the raspberries were quite encouraging. As has been pointed out in previous reports, it is necessary to protect raspberry canes by bending them down and covering with earth before winter sets in. Manure is not a satisfactory substitute for the earth.

We have not many varieties set out but the following table gives the data in regard to the fruit obtained from ten varieties.

RASPBERRIES—(irrigated).

Variety.	Color.	Date of First Picking.	Date of Last Picking.	Number of Pickings.	Number of Bushes.	Actual Yield.	Estimated Yield per Acre.	Size of Berry.
						Pts.	Pts.	
1 Sunbeam	Red	July 17	Aug. 28	12	20	17¼	2,006	Medium.
2 Herbert	"	" 17	" 28	12	20	20	2,326	Large.
3 Louden	"	" 17	" 28	12	17	18¾	2,435	"
4 Marlborough	"	" 17	" 21	12	12	14	2,917	"
5 Early King	"	" 17	" 28	12	10	11¾	3,013	Medium.
6 Sarah	Dark Red.	Aug. 7	" 28	5	20	4	.....	"
7 Shaeffer's Colossal	Red.	July 22	" 15	6	2	2⅜	.....	"
8 Cowarth	Black	" 22	" 15	5	2	1¾	.....	"
9 Golden Queen	Yellow.	" 26	" 15	3	4	¾	.....	Small.
10 Ruby	Red	" 17	" 3	3	2	¾	.....	Medium.

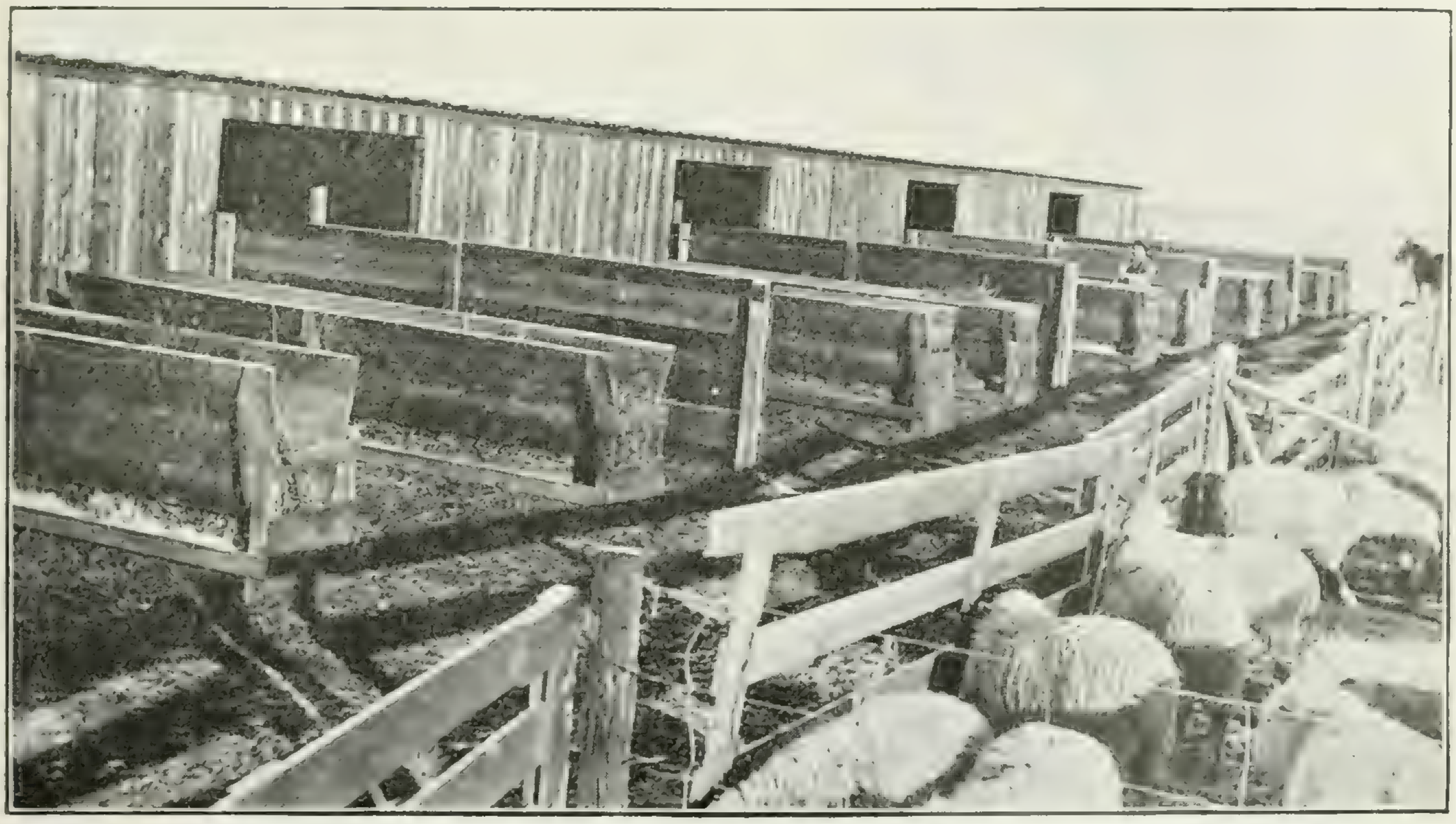
STRAWBERRIES—IRRIGATED.

The strawberries did very well. The bed was covered several inches deep with straw in the fall about the time the ground started to freeze up. For this purpose, straw a year old is better than fresh straw for the reason that it is less apt to blow off as it lies flatter. Another advantage is that many of the seeds in it have already germinated. Do not substitute manure for the straw as it sometimes smothers the plants.

We have thirty-two varieties under test. The bed was laid out with the rows three feet apart. Two rows each fifty feet long were set aside for each variety. The



Flock of Sheep at Experimental Station, Lethbridge, Alta.



Sheep yards and method of Feeding, Experimental Station, Lethbridge, Alta.

stand in many cases was poor, so that a report of the yields would not be of much value. The eight varieties that yielded the heaviest were the Beder Wood, Sample, Parsons' Beauty, Clyde, William Belt, August Luther, Senator Dunlap and Ridgeway. The Beder Wood yielded at the rate of 1,420 boxes per acre, the boxes being of the size commonly in use here containing four-fifths of an imperial quart. Among the eight varieties, the Senator Dunlap should receive special mention as being a particularly strong, vigorous grower.

TREES AND SHRUBS.

The trees in the border plantations and the ornamental shrubs wintered fairly well.

VEGETABLE GABDEN.

The results from the garden were not as satisfactory as in previous years. The last frost in the spring was somewhat later and the first one in the fall was earlier, than usual. This, in conjunction with the cooler weather during the summer on account of the greater number of cloudy days, was not favourable to the more tender vegetables such as tomatoes, squashes, corn, etc.

All the hardier vegetables, such as cabbage, cauliflower, beets, turnips, parsnips, etc., made very satisfactory growth. The celery, although planted late, came on well and was of exceptionally high quality.

FLOWERS.

The perennials, such as the pæonies, irises, etc., made a fine showing. An assortment of tulips put out during the previous October made a particularly brilliant display. Six varieties of narcissus were put out in the fall of 1910 along with the tulips. They bloomed nicely but are not so hardy as the tulips and do better if put in a more sheltered place. The usual assortment of annuals were planted and did reasonably well. The sweet peas and pansies, as usual, excelled in quality and abundance of bloom.

HORSES.

Eight work horses and four drivers are kept on the Station. In addition to this, there is a four-year old filly, an undesirable animal that will be disposed of.

CATTLE.

Two grade cows are kept to supply milk to the families on the Station.

MEETINGS AND CONVENTIONS ATTENDED.

The following meetings and conventions were attended and addresses given at most of them: The Western Canada Irrigation Association held at Calgary, August 8 to 10, the International Dry-Farming Congress at Colorado Springs, Colorado, in October, and the National Irrigation Congress at Chicago, December 5 to 9. As a member of the Grain Standards Board, I attended a meeting of that body in Winnipeg on October 25. I assisted at the Provincial Short Course Schools in Agriculture at Claresholm and Gleichen and spoke at a number of farmers' meetings at various times throughout the year. In February, I was in Ottawa at a conference of the Experimental Farms staff and had the opportunity of attending a number of

national conventions which were held in that city during the early part of February. In March, I addressed a meeting of the Southern Alberta Wool Growers' Association at Lethbridge.

DISTRIBUTION OF SAMPLES.

As the free distribution of samples of spring grain is now made from the Central Farm at Ottawa exclusively, potatoes and winter wheat are all that are distributed from here. The following material has been sent out or promised up to March 31, 1912.

	No.
Three-pound bags of potatoes	430
Five-pound bags of winter wheat	20

A small number of willow and poplar cuttings together with a four-ounce bag of Manitoba maple seeds have been promised to a number of applicants, amounting in all to 145.

INOCULATED ALFALFA SOIL.

A charge is now made of $1 to all applicants who desire inoculated alfalfa soil. On the payment of this amount by any farmer in Southern Alberta, the Station will supply a bag of inoculated alfalfa soil containing not less than one hundred pounds and will prepay the freight on the same to the applicant's nearest railway station. For the year ending March 31, 1912, 116 sacks have been shipped out or promised.

CORRESPONDENCE.

During the twelve months ending March 31, 1912, there were 3,670 letters received and 3,756 sent out, not including circulars and reports.

ACKNOWLEDGMENTS.

In July, Mr. F. L. S. Grisdale, a graduate of Macdonald College, came to the Station in the capacity of Assistant Superintendent and it is a pleasure to acknowledge his careful and able assistance. I wish also to take this opportunity of expressing my appreciation of the faithful and loyal services of Mr. G. D. McMillan, the foreman, and Mr. E. E. Eisenhauer, my secretary, and also those of Mr. Chas. Giffin. who has been in the employ of the Station for the past three years.

METEOROLOGICAL REPORT.

Months.	Highest Temperature F.		Lowest Temperature. F.		Total Precipitation.	Bright Sunshine
1911.	Date.	Degrees.	Date.	Degrees.	Inches.	Hours.
April	21	75·3	4	0·4	0·82	219·8
May	5	87·6	1	25·2	1·9	199·2
June	19	86·5	6	35·4	4·71	296·9
July	25	92·5	5	37 9	2·27	329·6
August	19	85·9	27	29·4	3·63	251·4
September	2	82·9	25	25·4	4·16	213·2
October	9	79·4	25	9·7	0·57	187·1
November	3	50·4	10	−23·5	0·95	95·6
December	3	58·1	29	−34·3	0·77	79·7
1912.						
January	15	48·6	11	−30·5	0·69	111·7
February	11	49·2	29	−23·5	0·4	140·6
March	27	63·3	4	−22·5	0·44	230·9
Totals					21·31	2,365·7

In the above table, ten inches of snow is computed as one inch of precipitation.

I have the honour to be, sir,
Your obedient servant,

W. H. FAIRFIELD,
Superintendent.

EXPERIMENTAL STATION FOR CENTRAL ALBERTA

REPORT OF G. H. HUTTON, B.S.A., SUPERINTENDENT.

LACOMBE, ALTA., March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa, Ont.

SIR,—I have the honour to submit the fifth annual report of the work of the Experimental Station for Central Alberta at Lacombe, Alta., for the year ending March 31, 1912.

The growing season of 1911 was peculiar to itself, the rain fall being heavier and mean temperature lower for every month without exception than the season of 1910. Spring opened rather later than the average of the five past seasons. The first seeding in each of these years was made on the dates as follows: 1907, April 30; 1908, April 10; 1909, April 19; 1910, March 31; and 1911, on April 22. The weather conditions after seeding were such as to retard germination, and high winds after the grain was above ground two or three inches checked growth. As compared with the season of 1910 the precipitation for 1911 was remarkable. For the six months from April 1, 10·6 inches of rain fell in 1910, while for the same period in 1911 the precipitation amounted to 17·8 inches.

Winter wheat wintered well particularly on breaking and has given profitable yields. The heavy rain caused a very rank straw growth and cool weather delayed maturity to such an extent that the spring wheat was caught by frost before it was ripe. With one exception all the fields of wheat in the rotations have paid the cost of production when valued at one cent per pound for feeding purposes and in one instance the wheat field paid a profit of $7.33 per acre.

The root crop was practically a failure, the yield of potatoes fair, and of corn poor. Small fruits have produced a fair crop while the apple orchard has made a good growth.

The ground froze up on October 21 which was ten days earlier than the earliest previous record and very little fall ploughing was done.

Snow falling on November 6 before threshing was completed delayed this operation greatly. Beyond the delay and extra cost of getting work done, no loss was suffered at the Station from this cause.

The winter with the exception of the first two weeks in January has been moderate and enjoyable weather. Snow was deep at no time though sleighing was good from November 18 to the last week in February.

EXPERIMENTS WITH WINTER WHEAT.

Nine varieties of winter wheat sown in 1910 on breaking of that season gave the following yields in 1911. Winter wheat has come through the winter in better condition when sown on breaking year after year than when sown on summer fallow.

WINTER WHEAT—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw including head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after Cleaning.
					Ins.		Ins.	Lbs.	Bush. Lbs.	Lbs.
1	Kharkov	Aug. 18	Sept. 6	384	46½	10	3	3,180	53 ..	61
2	Early Windsor	" 18	" 6	384	47	10	3	3,060	51 ..	60¾
3	Abundance	" 18	" 6	384	50	10	3	2,907	48 27	61½
4	Dawson's Golden Chaff	" 18	" 12	390	52	10	3¼	2,535	42 15	60⅓
5	Prosperity	" 18	" 6	384	50	10	3¾	2,528	42 8	59¾
6	Reliable	" 18	" 6	384	50	10	3	2,302	38 22	61¼
7	Alberta Red	" 18	" 6	384	44	10	2½	2,129	35 28	61½
8	Red Chief	" 18	" 6	384	46	10	3	1,819	30 19	61
9	Red Velvet Chaff	" 18	" 12	390	50	10	3	1,746	28 58	61

WINTER WHEAT—Quantities of Seed per Acre.

Kharkov winter wheat was sown on August 18 at the following rates of seed per acre:—

Variety.	Quantity of Seed.	Date Sown 1910.	Date Cut 1911.	Yield Per Acre.
				Bush. Lbs.
Kharkov	½ bushel	Aug. 18	Sept. 10	53 45
"	¾ "	" 18	" 9	48
"	1 "	" 18	" 8	47 45
"	1¼ "	" 18	" 6	45 45
"	1½ "	" 18	" 6	46 45
"	1¾ "	" 18	" 6	43 45
"	2 "	" 18	" 6	53 15

WINTER WHEAT—Dates of Sowing.

Tests in dates of sowing of winter wheat conducted in the season of 1911 have given the same general result as those of previous years. Basing advice on these results, winter wheat should be sown in Central Alberta about the middle of August.

EXPERIMENTS WITH SPRING WHEAT.

The experiments with spring wheat were not productive of results of any value in 1911 for the reason that the land on which the test of varieties was being conducted was badly washed out on June 21 and thus the standing of the varieties does not indicate their merit. Other experiments in spring wheat did not come to full maturity and were not threshed.

EXPERIMENTS WITH RYE.

One plot of fall rye was sown on August 18, 1910, on breaking of that year and one of spring rye on April 29, 1911, on land that had been in potatoes in 1910.

Variety.	Date Ripened.	No. Days Maturing.	Length of Straw.	Character of Straw.	Length of Head.	Weight of Straw.	Yield Per Acre.
			Ins.		Ins.	Lbs.	Bush. Lbs.
Fall Rye..	Aug. 24	371	66½	9½	3¾	7,475	28 10
Spring Rye.	Sept. 13	138	53	10	4¼	5,560	26 24

EXPERIMENTS WITH EMMER AND SPELT.

Emmer and spelt have been tried at this Station for five years and as a result of these tests it is impossible to recommend either of these grains for this part of Alberta.

EXPERIMENTS WITH OATS.

Twenty-one varieties of oats were sown in 1911 on land that had been in roots and potatoes in 1910. Plots were one-fortieth of an acre; the soil was a black clay loam and the seeding was done on April 29. Seed was used at the rate of from two bushels and three pecks to three bushels per acre.

OATS—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after cleaning.
					In.		In.	Lbs.	Bush. Lbs.	Lbs.
1	Pioneer....	Apr. 29.	Sept. 13.	137	54	10	8¾	4,637	136 13	43
2	Irish Victor.....	" 29.	" 11.	135	59	9	9	4,310	126 26	42
3	Siberian.....	" 29.	" 14	138	57	10	7½	4,160	122 12	40¾
4	Guelregn.....	" 29.	" 9.	133	61	10	8	4,050	119 4	43¾
5	Swedish Select.	" 29.	" 14.	138	55	10	8½	4,028	118 16	40¾
6	Tartar King.	" 29.	" 11.	135	62	9	9½	4,014	118 2	38½
7	Abundance..	" 29.	" 14.	138	56	10	8¼	3,904	114 28	44
8	Improved American.....	" 29.	" 13.	137	59	7	8	3,900	114 24	41
9	Golden Beauty.....	" 29.	" 14.	138	55	5	7½	3,870	113 28	35¼
10	Gold Rain.....	" 29.	" 9.	133	58	7½	8¼	3,703	108 31	44½
11	Danish Island.....	" 29.	" 13.	137	59	5	8	3,650	107 12	38
12	Segerhafre.....	" 29.	" 15.	139	56	7	7	3,620	106 16	41
13	Victory.....	" 29.	" 19.	143	57	9½	7	3,600	105 30	42½
14	Banner	" 29.	" 19.	143	62	5	8	3,470	102 2	35½
15	Thousand Dollar.	" 29.	" 13.	137	56	8½	7½	3,230	95 00	36
16	Blackhafre.	" 29.	" 15.	139	68	8	8½	3,201	94 5	35½
17	Twentieth Century.....	" 29.	" 19.	143	60	10	7½	2,880	87 2	36
18	Improved Ligowo.....	" 29.	" 9.	133	56	8	6½	2,955	86 31	41
19	Regenerated Abundance..	" 29.	" 13.	137	56	9½	7½	2,950	86 26	38½
20	Ligowohafre	" 29.	" 9.	133	54	8	7	2,880	84 24	37
21	Stormogulhafre.....	" 29.	" 15.	139	55	6	10	2,730	80 10	31

OATS—Dates of Sowing.

A test was again made this year to determine the desirability of early seeding of oats.

Variety.	Date Sown.	Date Ripened.	No. of Days Maturing.	Weight of Straw.	Yield Per Acre.	
				Lbs.	Bush.	Lbs.
Banner	May 6th.	Sept. 19.	136	11240	67	2
"	" 13th.	" 19.	129	11960	38	28
"	" 20th.	" 19.	122	11680	42	12
"	" 27th.	" 19.	115	11520	35	10

OATS—Quantities of Seed.

Tests have been made for a sufficient length of time with varying quantities of seed per acre to warrant the statement that for Central Alberta from three to three and one-half bushels of seed per acre are likely to give the best results on well-worked soils similar to that at this station. Along the eastern boundary of the province where there is not such a large percentage of humus in the soil nor such a great depth of surface soil, less seed than the amounts named may be found to give best results.

EXPERIMENTS WITH BARLEY.

The test of varieties of barley was conducted on black clay loam soil that was in roots and potatoes in 1910. The plots were one-fortieth of an acre in size and both six-rowed and two-rowed varieties were sown on April 28. Seed was used at the rate of two bushels and one peck per acre.

SIX-ROW BARLEY—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.		Weight per measured bushel after Cleaning.
					In.		In.	Lbs	Bush.	Lbs.	Lbs.
1	Hannchen	Apr. 28	Sept. 5	130	50	7	3	3940	78	36	48½
2	Hannchenkorn	" 28	Aug. 31	125	48¼	8	2¾	3268	68	4	52
3	Prinzesskorn	" 28	Sept. 2	127	42¼	8	3	3210	66	42	46
4	Primuskorn	" 28	" 1	126	53	8	2¾	3190	66	22	50½
5	Swedish Chevalier	" 28	" 5	130	48½	7	4¾	2920	60	40	45½
6	Svanhalskorn	" 28	Aug. 25	119	39½	10	2½	2880	60	..	50½
7	Invincible	" 28	Sept. 5	130	56½	7½	3½	2870	59	38	43
8	Danish Chevalier	" 28	" 1	126	57½	9½	4½	2770	57	34	47
9	Early Chevalier	" 28	" 1	126	53	9½	2¾	2770	57	34	49
10	Standwell	" 28	" 5	130	51½	7	2½	2690	56	2	42½
11	Clifford	" 28	Aug. 31	125	57	10	3¼	2660	55	20	49
12	Canadian Thorpe	" 28	Sept. 1	126	55½	9	3¼	2620	54	28	43
13	Beaver	" 28	Aug. 31	125	60	10	4¼	2360	49	8	47

TWO-ROW BARLEY—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw, including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	Weight per measured bushel after Cleaning.
					In.		In.	Lbs	Bush.	Lbs.	Lbs.
1	Claude	Apr. 28	Sept. 1	126	51½	9½	3	4430	92	14	43
2	Manchurian	" 28	" 5	130	56½	9	3¼	4240	88	16	45½
3	Albert	" 28	" 1	126	55	10	3¾	4210	87	34	45
4	Mansfield	" 28	" 1	126	53	8½	2¾	4000	83	16	48½
5	O.A.C. No. 21	" 28	" 5	130	56⅗	8½	2¾	3880	80	40	45
6	Nugent	" 28	" 5	130	57	9	3¼	3880	80	40	47
7	Odessa	" 28	Aug. 29	123	52	7	2¾	3720	77	24	46
8	Oderbruch	" 28	Sept. 2	127	55½	9	3¼	3720	77	24	47
9	Stella	" 28	" 1	126	56	10	3	3670	76	22	48
10	Trooper	" 28	" 1	126	53¼	10	3⅕	3550	73	46	46
11	Guy Mayle	" 29	Aug. 24	117	34	10	2¼	2700	56	12	61½

PEAS AND OATS AS A MIXTURE FOR GREEN FEED OR FOR CURING FOR HAY.

Reference was made in the report for the year ending March 31, 1911, to the possibilities of the above mixture as a feed for dairy cattle or other farm stock. Eight acres were seeded this year to a mixture of two bushels of oats and one of peas per acre. The product of this area cut and cured as hay was put over the scales when ready for stacking and produced fodder at the rate of four tons and forty-two pounds per acre. The value per acre of this crop is shown in tables covering rotation 'K' and rotation 'O.'

EXPERIMENTS WITH ALFALFA.

Of the varieties of alfalfa under test, Grimm and Turkestan are holding the lead. *Medicago falcata,* the Siberian strain, is proving perfectly hardy. The general conclusion is evident that where hardy strains are secured and inoculation of the soil successfully carried out the growing of alfalfa may be attempted here with every prospect of satisfactory results. An area of about twelve acres is now seeded to alfalfa and gave an average yield this year of two tons sixteen hundred and sixty-five pounds per acre. The following letter gives the opinion of Mr. C. A. Julian Sharman, of Red Deer, of alfalfa as a feed:—

RED DEER, ALTA., March 9, 1912.

G. H. HUTTON, B.S.A.,
Superintendent, Experimental Station,
Lacombe, Alta.

DEAR SIR,—The crop of alfalfa grown on soil inoculated with earth received from you has certainly been of a rank, rich colour. Gave a very fair crop in 1910 and an excellent crop in 1911; the amount I would not like to estimate, as I believe one is prone to exaggerate yields on small areas. You may be interested to know that the roughage Rosalind of Old Basing has received the last six months (September 1, 1911, to March 1, 1912) has practically consisted of the crop from our alfalfa patch and that during that time she has given 7,897 lbs. of milk, 521 lbs. of butter, which with the value of skim milk has produced f.o.b. Red Deer $225. Two weeks

ago we ran out of alfalfa and her yield per day dropped from 43 lbs. to 39 lbs. I have now got (two days ago) a supply of alfalfa from Lethbridge and she has already gone back to 43 lbs. I have been shipping in alfalfa meal from Los Angeles, California, this winter in small quantities, but for next winter I have quite made up my mind to buy alfalfa hay by the carload: it will cost me about $25 per ton but I know there will be more money in it than prairie hay at $8 to $10.

This year I would like to seed a further seven or eight acres to alfalfa. I hate to disturb the plot we have to get the necessary soil even if it is sufficiently inoculated. which I do not know. Can you sell me seven or eight hundred pounds of soil and if so what would it be worth at Red Deer?

Yours very truly,

(Signed) C. A. JULIAN SHARMAN.

EXPERIMENTS WITH INDIAN CORN.

On account of the cold, wet season the yields of Indian corn are low. Seven varieties were planted on May 27, on land which had been in summer-fallow in 1910. The seed was planted in hills two and one-half feet apart each way. The crop was cut on August 28.

INDIAN CORN FOR ENSILAGE—Test of Varieties.

No.	Name of Variety.	Date of Sowing.	Date of Cutting.	Weight per acre grown in hills.	
				Tons.	Lbs.
1	Longfellow	May 27	Aug. 28	5	1,484
2	North Western Dent	" 27	" 28	4	976
3	Angel of Midnight	" 27	" 28	4	118
4	Eureka	" 27	" 28	3	1,936½
5	Compton's Early	" 27	" 28	3	798
6	Selected Leaming	" 27	" 28	2	1,478
7	Superior Fodder	" 27	" 28	2	356

EXPERIMENTS WITH FIELD ROOTS.

Turnips, carrots, mangels and sugar beets were all seeded on May 13 on land that had been in wheat in 1910. They were sown on the flat in drills thirty inches apart. On June 21 a very heavy rain of one and one-fifth inches in twenty minutes caused a washout over the root field so that the reports of the variety tests of this entire line of experiments are valueless.

POTATOES.

Twenty-two varieties of potatoes were planted in 1911 on land that had been in wheat in 1910, fall ploughed and packed. The potatoes were planted on May 24 in rows two and one-half feet apart. The seed was cut to about two eyes to the piece and the cuttings were dropped about fourteen inches apart in the row and covered to a depth of about three to four inches. Frequent shallow cultivation was given throughout the season and high hilling was not practised. They were dug Sept. 30.

POTATOES—Test of Varieties.

Name of Variety.	Average size.	Total yield per Acre.		Total yield marketable.		Total yield unmarketable.		Form and Colour.
		Bus.	Lbs.	Bus.	Lbs.	Bus.	Lbs.	
British Queen	Medium	269	30	194	04	75	26	White, oval.
Table Talk	"	267	51	235	13	32	38	"
Reeves' Rose	Small	245	51	154	53	90	58	Red, oval.
Empire State	"	221	6	128	4	93	2	White, oval.
Ashleaf Kidney	"	217	48	148	7	69	41	Pink, oval.
Everett	"	214	30	160	52	53	28	Red, oval.
American Wonder	Medium	211	12	173	11	38	1	White, oval.
Late Puritan	Large	208	27	191	46	16	41	"
Carman No. 1	Medium	204	36	153	31	51	5	"
Morgan Seedling	"	200	12	150	9	50	3	Pink, long.
Rochester Rose	Small.	182	3	118	19	63	44	"
Irish Cobbler	Medium	155	6	116	19	38	47	White, round.
Gold Coin	Small.	147	57	99	7	48	50	White, oval.
Dreer's Standard	Medium	132	00	92	24	39	36	"
Vick's Extra Early	"	123	12	96	5	27	7	"
Dalmeny Beauty	Small.	92	57	49	15	43	42	White, long.
Dooley	Large	83	3	67	16	15	47	White, oval.
Holborn Abundance	"	77	00	60	43	15	77	"
Pioneer	"	67	39	54	7	13	32	"
Hard to Beat	Small.	45	39	23	16	22	23	Flat, white.
Factor	"	42	54	23	36	19	18	Round, white.
Money Maker	Medium	41	15	30	56	10	19	White, long.

EXPERIMENTS WITH FIELD PEAS.

The early varieties of field peas have again demonstrated their superiority for Central Alberta. Among the varieties recommended are: English Grey, Early Harvest and Mackay.

ROTATIONS.

The following rotations are now under way. The tables indicate the run of the rotations, show the yield secured and the profits per acre of each:—

ROTATION RECORD 'C'—(Crop year, 1911).

ITEMS OF EXPENSE IN RAISING CROP.												PARTICULARS OF CROP.								
Rent and Manure.	Seed, Twine and use of Machinery.	Manual Labour.		Horse labour (including teamster).				Cost of Threshing.	Total Cost.	Cost for 1 Acre.	Cost for 1 Bushel.	Height of Stubble.	Weight in Pounds.		Total Value.	Value of Crop per Acre.	Profit per Acre.	Rotation.	Lot.	Area in Acres.	This Year.
		Hours Manual Labour.	Cost of Manual Labour.	Hours.			Value of Horse Labour.						Grain.	Straw.						
				2 Horse Team.	3 Horse Team.	4 Horse Team.															
$ cts.	$ cts.	$ cts.	$ cts.	Hr.m.	Hr.m.	Hr.m.	$ cts.	$ cts.	$ cts.	$ cts.	$ cts.	Ins.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.				
2 00	0 60	....	.....	4 21	.....	5¾	4 24	.....	6 84	6 84	.....	.....	.....	.....	.....	.....	....	C.	1	1	Summer-fallow.
2 00	2 75	10 30	1 99	2 35	1¼	.....	1 39	2 24	10 37	10 37	32 3	6	1,922	7,860	23 15	23 15	12 78	C.	2	1	Wheat.
2 00	2 75	6 30	1 23	2 35	1¼	.....	1 39	2 24	9 61	9 61	30	6	1,922	7,860	23 15	23 15	13 54	C.	3	1	Wheat.
6 00	6 10	17 00	3 22	9 31	2 30	5 45	7 02	4 48	26 82	.....	62 3	.....	3,844	15,720	46 30	... .	26 32	.....	.....	3	
2 00	2 03	5 40	1 07	3 10	50	1 55	2 34	1 49	8 94	8 94	20 7	.....	1,281	5,240	.....	15 43	8 77	.....	.....	.....	

ROTATION RECORD 'K'—(Crop year, 1911).

ITEMS OF EXPENSE IN RAISING CROP.													PARTICULARS OF CROP.									
		Manual Labour.		Horse Labour (including teamster).									Weight in Pounds.									
Rent and Manure.	Seed, Twine and Use of Machinery.	Hours Manual Labour.	Cost of Manual Labour.	Hours.				Value of Horse Labour.	Cost of Threshing.	Total Cost.	Cost for 1 Acre.	Cost for 1 Bushel.	Height of Stubble.	Grain.	Straw.	Hay.	Roots and Ensilage.	Total Value.	Value of Crop per Acre.	Profit per Acre.	Rotation.	Lot.	Area in Acres.	This Year.
				Single Horse.	2 Horse Team.	3 Horse Team.	4 Horse Team.																	
$ cts.	$ cts.	$ cts.	$ cts.	Hr.m.	Hr. m	Hr. m	Hr. m	$ cts.	$ cts.	$ cts.	$ cts.	Cts.	Ins	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.				
15 64	9 41	15½	2 94	.....	15¾	7 50	9 32	12 87	5 03	45 89	11 74	63·08	6	4,314	16,068	.....	.....	51 17	13 09	1 35	K	1	3,909	Spring Wheat.
15 64	6 88	7¼	1 38	.....	8 25	2 45	9 13	8 64	5 45	37 99	9 72	34·08	6	5,235	7,077	.....	.....	59 43	15 20	5 48	K	2	3,909	Barley.
15 64	7 31	12·40	2 41	.....	7 35	3 30	9 13	8 65	5 99	40 00	10 23	26·07	6	5,092	11,350	.....	.....	62 27	15 93	5 70	K	3	3,909	Oats.
15 64	7 76	20·10	3 83	.....	7 25	2 45	9 13	8 30	6 84	42 37	10 84	24·08	6	5,812	18,840	.....	.....	76 96	19 69	8 85	K	4	3,909	Oats.
15 64	14 41	51·55	9 86	.....	33 05	3 35	9 13	17 70	.....	57 61	14 74	.....	6	.....	.....	33,890	.....	169 45	43 35	28 61	K	5	3,909	Green Feed.
15 64	25 95	372·05	70 70	44 50	108 25	.....	9 13	53 38	.....	165 67	42 38	.....	....	.....	.....	.....	23,609	185 45	47 44	5 06	K	6	3,909	Hoed Crop.
93 84	70 92	479·35	91 12	44 50	180 40	20 25	55 37	109 54	23 31	389 53	.....	$1·501		20,453	53,335	33,890	23,609	604 73	.....	55 05	....	..	23,454	
4 01	3 02	20·27	3 88	1 55	7 43	52	2 22	4 67	.99	.....	16 61	Cts. 25		872	2,274	1,445	1,007	.....	25 78	9 18	....	..	.....	

ROTATION RECORD 'L'—(Crop year, 1911).

Items of Expense in Raising Crop.														Particulars of Crop.									
Rent and Manure.	Seed, Twine and Use of Machinery.	Manual Labour.		Hours of Labour (including teamsters)					Cost of Threshing.	Total Cost.	Cost for 1 Acre.	Cost for 1 Bushel.	Height of Stubble.	Weight in Pounds.			Total Value.	Value of Crop per Acre.	Profit per Acre.	Rotation.	Lot.	Area in Acres.	This Year.
		Hours Manual Labour.	Cost of Manual Labour.	Hours.				Value of Horse Labour.						Grain.	Straw.	Hay.							
				Single Horse.	2 Horse Team.	3 Horse Team.	4 Horse Team.																
$ cts.	$ cts.	Hr. m.	$ cts.		Hr. m.	Hr. m.	Hr. m.	$ cts.	$ cts.	$ cts.	$ cts.	Cts.	Ins.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.				
6 96	2 31	13 30	2 56	2½	6½	....	.....	2 88	.....	14 71	8 45	.....	....	....	.....	6,477	32 38	18 60	10 15	L	1	1·74	Hay.
6 96	2 31	13 30	2 56	2½	6½	.....	.....	2 88	.....	14 71	8 45	.....	....	.....	.....	6,477	32 38	18 60	10 15	L	2	1·74	Hay.
6 96	2 31	2 30	0 47	½	3¾	.....	.....	1 40	.....	11 14	6 40	.....	....	.....	.....	3,096	20 48	11 77	5 37	L	3	1·74	Pasture.
6 96	4 25	4 55	0 93	....	8½	4¼	4½	6 99	1 05	20 18	11 50	1 34	6	900	8,980	500	15 99	9 19	−2 31	L	4	1·74	Wheat.
6 96	3 28	7 40	1 46	....	4 50	1 35	5 03	4 71	3 27	19 68	11 31	24 09	6	2,778	5,170	.. .	32 95	18 94	7 63	L	5	1·74	Oats.
6 96	3 33	2 55	0 55	....	3 20	2 00	5 03	4 37	2 23	17 44	10 02	39 1	6	2,138	4,060	.. ..	25 44	14 62	4 60	L	6	1·74	Barley.
41 76	17 79	45 00	8 53	5 30	33 25	8 20	14 36	23 23	6 55	97 86	...	... .	....	5,816	18,210	16,550	159 62	.....	35 59	....	....	10·44	... ...
4 00	1 70	1 19	0 82	0 32	3 12	0 47	1 24	2 23	0 63	.	9 36	32 87	....	557	1,744	1,585	....	15 29	3 40	....	....	...	.....

ROTATION RECORD 'N'—(Crop year, 1911).

ITEMS OF EXPENSE IN RAISING CROP.												PARTICULARS OF CROP.							
Rent and Manure.	Seed, Twine and Use of Machinery.	Manual Labour.		Horse Labour (including teamsters).					Total Cost.	Cost for 1 Acre.	Height of Stubble.	Weight in Pounds.		Total Value.	Value of Crop per Acre.	Profit per Acre.	Rotation.	Lot.	Area in Acres.	Last Year.	This Year.
		Hours Manual Labour.	Cost of Manual Labour.	Hours.				Value of Horse Labour.				Hay.									
				Single Horse.	2 Horse Team.	3 Horse Team.	4 Horse Team.														
$ cts.	$ cts.	Hr.m.	$ cts.	Hr.m.	Hr.m.	Hr.m.	Hr.m.	$ cts.	$ cts.	$ cts.	Ins.	Lbs.		$ cts.	$ cts.	$ cts.					
4 03	4 87	10 29	1 99	0 38	4 18	.. ..	.....	1 63	12 52	11 56	...	4,195		25 17	23 27	11 71	N	1	1·083	Alfalfa ..	(Alfalfa.
4 03	4 87	10 29	1 99	0 38	4 18	... ..	.....	1 63	12 52	11 56	.....	4,195		25 17	23 27	11 71	N	2	1·083	" ..	"
4 03	4 87	10 29	1 99	0 38	4 18	....	.....	1 63	12 52	11 56	.....	4,195		25 17	23 27	11 71	N	3	1 083	" ...	"
4 03	4 87	10 29	1 99	0 38	4 18	.....	.....	1 63	12 52	11 56	.....	4,195		25 17	23 27	11 71	N	4	1·083	" ...	"
4 03	4 87	10 29	1 99	0 38	4 18	.....	.....	1 63	12 52	11 56	.....	4,195		25 17	23 27	11 71	N	5	1·083	" ...	"
4 03	4 87	10 29	1 99	0 38	4 18	....	.....	1 63	12 52	11 56	.... .	4,195		25 17	23 27	11 71	N	6	1·083	" ...	"
4 03	2 73	4 25	0 84	. .	9 35	0 55	2 50	5 00	12 60	11 61	6	9,628		48 14	44 37	32 76	N	7	1·083	" ...	Green feed
28 21	31 95	97 19	12 79	3 48	35 23	0 55	2 50	14 78	87 72	.....	.....	34,798		199 68	.....	103 02	....	....	7·581	.....	.....
3 72	4 21	8 53	1 68	0 30	4 40	0 07	0 22	1 95	.....	11 57	....	4,590		.....	26 25	13 59	....	....	...	....	.....

ROTATION RECORD 'O'—(Crop year, 1911).

ITEMS OF EXPENSE IN RAISING CROP.													PARTICULARS OF CROP.									
Rent and Manure.	Seed, Twine and Use of Machinery.	Manual Labour.		Horse Labour (including teamster.)					Cost of Threshing.	Total Cost.	Cost for 1 Acre.	Cost for 1 Bushel.	Height of Stubble.	Weight in Pounds.				Total Value.	Value of Crop per Acre.	Profit per Acre.	Rotation.	Lot.	Area in Acres.	This Year.
		Hours Manual Labour.	Cost of Manual Labour.	Hours.				Value of Horse Labour.						Grain.	Straw.	Hay.	Roots and Ensilage						
				Single Horse	Two Horse Team.	Three Horse Team.	Four Horse Team.																
$ cts.	$ cts.	Hr. m.	$ cts.	Hr. m.	Hr. m.	Hr. m.	Hr. m.	$ cts.	$ cts.	$ cts.	$ cts.	Cts.	In.	Lbs.	Lbs.	Lbs.	Lbs.	$ cts.	$ cts.	$ cts.				
9 18	8 00	9 05	1 73	.....	9 35	3 30	2 55	6 09	5 10	30 10	9 38	41·3	6	4,372	19,860	.....	.....	53 65	16 71	7 33	O	1	3·2107	Wheat.
7 79	5 77	17 55	3 40	.....	19 40	5 55	5 00	11 52	4 65	33 13	12 15	14·0	6	3,950	10,050	13,144	.....	115 27	42 27	30 12	O	2	2·727	Oats.
9 33	1 96	8 55	1 69	.....	10 17	.....	12 56	9 71	.....	22 69	6 96	....		.....	.....	.....	.....	... .	.....	.....	O	3	3·262	Summer-fallow.
11 78	8 04	11 55	2 26	.....	6 42	5 20	7 36	8 12	8 28	38 48	9 34	23·2	6	7,955	12,620	.. ..	.. ...	92 17	22 40	13 06	O	4	4·119	Barley.
11 78	8 34	22 50	4 34	. . . .	7 08	3 40	8 36	8 06	11 25	43 77	10 63	15·5	6	9,560	12,260	.....	.....	107 86	26 19	15 56	O	5	4·119	Oats.
11 78	15 09	62 25	11 86	....	25 38	8 45	8 36	16 44	. . .	55 17	13 39	....	6	.....	.... .	30,540	.....	152 70	37 07	23 68	O	6	4·119	Green feed.
11 78	23 82	198 40	37 75	47 15	53 11	.....	6 48	34 10	. ..	107 45	26 09	....		.....	.....	.....	32,118	251 58	61 80	35 71	O	7	4·119	Hoed crop.
73 42	71 02	331 45	63 03	47 15	132 11	27 10	52 27	91 01	29 28	330 79	.... .	94·0		25,837	54,790	43,684	32,118	776 23	.....	125 46	..	..	25·6757	
2 86	3 06	12 55	2 46	1 15	5 08	1 03	2 03	3 66	1 14	.....	12 88	13·4		1,006	2,134	1,701	1,251	.....	30 23	17 92	..	..	.....	

SUMMARY OF CROPS—1911.

	Bush.	Lbs.
Wheat—		
9·9427 acres	159	46
12 uniform test plots	3	..
Oats—		
16·404 acres	790	32
21 uniform test plots	31	11
Winter Wheat—		
7·699 acres	252	..
13 uniform test plots	5	13
Barley—		
11·768 acres	417	22
24 uniform test plots	42	21
Peas—		
13 uniform test plots	2	36
Potatoes—		
3·44 acres	800	..
Roots—		
2 acres	174	..

Hay—	Tons.	Lbs.
Timothy, 8·23 acres	16	676
Alfalfa, 13·98 acres	24	17
Mixed hay, 4·25 acres.		

GARDEN VEGETABLES.

BEANS.

Beans were planted on May 31 in rows thirty inches apart. Plants were up on June 10 and commenced to bloom on July 21. The variety Challenge Black Wax selected by the Central Experimental Farm was the only one which became fit for table use.

BEETS.

Beets were sown on May 9, germinating poorly making it necessary to sow again on June 3. The later sown made a very rapid growth. Seven varieties were tested.

Variety.	In Use.		Yield per Acre.	
			Bush.	Lbs.
Egyptian	Aug.	28..	580	48
Eclipse	"	28..	539	36
Early Blood Red Turnip	Sept.	1..	464	38
Meteor	Aug.	31..	421	4½
Ruby Dulcet.	"	31.	392	2½
Black Red Ball	Sept.	8..	212	57
Egyptian Dark Red Flat.	"	10..	111	31

BRUSSELS SPROUTS.

Seed was sown April 17 in the frame and transplanted on June 7. The plants were not attacked by the root maggot to the same extent as cabbage and cauliflower. The variety grown was Dwarf Improved and was ready for use on September 20.

CABBAGE.

The first sowing was made March 31 in the hot-bed. Transplanting into the open commenced on May 12. The following varieties were tested:—

Variety.	In Use.		Average Weight.
Flat Swedish	Sept.	10..	10¼ lbs.
Improved Amager Danish Roundhead	"	11.	10 "
Extra Amager Danish Ballhead	"	25..	9 "
Early Jersey Wakefield	Aug.	21..	9 "
Copenhagen Market	"	12..	8½ "
Large Late Flat Drumhead	Sept.	18.	6½ "
Magdeburg	"	25..	6½ "
Danish Summer Ballhead	"	7.	6¼ "
Winningstadt	"	25..	6 "
Danish Ballhead	"	22..	5½ "
Lubeck	Oct	22.	5½ "
Extra Dark Red Dutch	Sept.	23..	4½ "
Small Erfurt	"	9..	4 "
Danish Delicatesse Red	"	27..	4 "
Extra Early Midsummer Savoy	Aug.	28..	3½ "
Red Danish Stonehead	Sept.	29..	3 "

CAULIFLOWER.

Seed was sown in the frame April 20 and transplanted on June 6. The varieties are given below:—

Variety.	In Use.		Per cent. of Good Heads.
Danish Giant	Aug	25..	33 per cent.
Early Snowball	"	11..	62 "
Extra Selected Early Erfurt Dwarf	"	11..	62 "

CARROTS.

Two sowings of carrots were made, the later one making the quicker growth and giving the heavier crop. Seed was sown on June 9 in rows thirty inches apart. The varieties were:—

Variety.	In Use.	Yield per Acre.	
		Bush.	Lbs.
French Horn	Sept. 5.	479	9
Oxheart or Guerande	Aug. 28.	464	38
Half Long Chantenay	" 28	406	33
Chantenay	Sept. 5.	338	48
Nantes	Aug. 28	256	31

CELERY.

Seed was sown in the frame April 10 and transplanted July 27 into trenches. The varieties were:—

Variety.	Average Weight of Twelve Heads.	Quality.
Paris Golden Market	8½ lbs.	Good.
Giant Pascal	9 "	Medium.
Rose Ribbed Paris	6 "	Fair.
French's Success	6 "	Very good.
Noll's Magnificent	8 "	Fair.
Evan's Triumph	8 "	Good.

SWEET CORN.

Seven varieties of corn were planted on May 19. Three varieties produced cobs, Squaw, Malakoff and Fordhook Early, the earliest being Squaw. The following varieties were tested:—

Malakoff,
Fordhook Early,
Golden Bantam,
Early Evergreen,
Devitt's Early Sugar,
Squaw,
Henderson's Metropolitan.

CUCUMBERS.

Four varieties were tried but no fruit set.

LETTUCE.

Two sowings of lettuce were made and both did well. Seed was sown on May 9 and June 9 in rows fifteen inches apart.

Sown in open May 9, germinated May 20, quantity sown 15 feet.

Sown in open June 9, germinated June 15, quantity sown 15 feet.

Variety.	Ready to Use.		No. Good Heads.		Quality.
	1st Sowing.	2nd Sowing.	1st Sowing.	2nd Sowing.	
Red Edged Victoria	July 14	Aug. 15	26	20	Good.
Wheeler's Tom Thumb	" 11	" 9	31	31	Good.
Cos Trianon	" 14	" 21	24	21	Poor.
All Heart,	" 10	" 9	31	28	Very good.
*Grand Rapids	" 14	" 15	21	30	Medium.
Giant Crystal Head	" 14	" 15	31	26	
Black Seeded Simpson	" 4	" 15	31	24	Good.
†Crisp as Ice	" 12	" 9	30	28	Good.
Iceberg	" 7	" 15	29	24	
*Grand Rapids	" 14	" 15	19	28	Very good.
Hanson	" 14	" 15	23	24	Medium.
May King	" 13	" 9	20	28	Good.
Improved Hanson	" 7	" 14	31	29	Good.

* Different seedsmen. † Crisp as Ice is a red lettuce.

MUSK MELONS.

Six varieties of muskmelons and four of watermelons were planted on June 1, but none came to maturity.

ONIONS.

Seven varieties of onions were sown. The first sowing was made on May 1 but was destroyed by cutworms. A later sowing made June 3, proved too late for a crop.

PARSNIPS.

Seed of two varieties was sown in rows thirty inches apart May 1.

Variety.	Yield per Acre.	In Use.	Quality.
*Hollow Crown	416 14	Aug. 28.. ...	Good.
*Hollow Crown	484 ..	Aug. 28..	Good.

* Different Seedsmen.

PARSLEY.

Double Curled Parsley was sown on May 1 and June 10. Both sowings made satisfactory growth.

PEAS.

Seed was sown in rows three feet apart and thirty feet long on May 18, of the following varieties:—

Variety.	In Use.	Crop.	Quality.
Gregory's Surprise	July 29.	Light	Medium.
Gradus	Aug. 3.	"	Good.
American Wonder	" 9.	Medium	"
McLean's Advancer	" 14.	Good	Fair.
Heroine	" 25.	"	"
Stratagem	" 12.	"	Good.
Telephone	" 15.	"	"
Thomas Laxton	" 9.	Medium	"
Premium Gem	" 1.	"	"
Sutton's Excelsior	" 7.	"	Medium.
Juno	" 29.	Very good	Good.

Garden peas inoculated with 'Farmogerm' secured from the 'Earp-Thomas Farmogerm Co.,' Bloomfield, N.J., U.S.A., were planted in the garden May 31 in rows thirty feet long and untreated seed sown on the same date under similar conditions, gave the following results:—

	Inoculated		Uninoculated	
	Vines	Pods	Vines	Pods
Garden peas	44 lbs.	12 lbs.	30 lbs.	9 lbs. 2 oz.

In addition to the marked difference in the weight of both vines and pods in favour of the inoculated row there was also a noticeable development in the bacterial growth on the roots of the peas grown from treated seed.

RADISHES.

Two sowings were made on May 1 and June 6 in rows thirty feet long. The following varieties were sown:—

Variety.	Second Sowing in use	Quality.
Forcing Turnip, scarlet	July 13	Poor.
Turnip Early, scarlet, white tipped	" 11	Good.
Non Plus Ultra	" 11	Medium.
Rosy Gem	" 11	"
White Icicle	" 13	Good.

SQUASH.

Eight varieties of squash were planted June 1 in hills nine feet apart each way. The only variety producing a crop was the Long White Bush Marrow.

TOMATOES.

A sowing made April 18 in the hotbed produced strong plants which were transplanted June 7. Ten varieties were tried. Only two set fruit, being Earliana C. E. F. 12/23 and Northern Adirondack Earliana.

TURNIPS.

One variety, Early White Flat Strapped, was sown May 1 and was ready for use July 11. The yield was 3,015 bush. 19 lbs. per acre. The table quality of these turnips in the early part of the season was good.

SALSIFY.

Long White Salsify was sown May 1 and was ready for use August 31. The roots were dug October 19. The yield per acre was 193 bush. 36 lbs.

FLOWER GARDEN.

The following varieties of annuals were sown in the frame March 31 and were out in the open June 23:—

Variety.	In Bloom. From.	To.
Asters, (14 varieties)	Aug. 12	Severe frost
Abronia umbellata	No bloom	
Ageratum	"	
Antirrhinum (6 varieties)	"	
Balsam	"	
Brachycome	"	
Calendula	Aug. 5	Severe frost
Candytuft	July 8	
Celosia (3 varieties)	No bloom	
Coreopsis	July 27	Sept. 25
Dianthus (7 varieties)	Aug. 8	" 25
Eschscholtzia (2 varieties)	July 28	" 25
Gaillardia	Aug. 7	" 25
Helichrysum	July 27	" 25
Godetia	Aug. 15	" 25
Iberis	No Bloom	
Larkspur (3 varieties)	"	
Lobelia	Aug. 11	" 25
Nicotiana	Sept. 5	" 25
Nemophila	July 15	" 25
Pansy 8 varieties.	July 4	" 25
Phlox Drummondi	Aug. 10	" 25
Scabiosa (3 varieties).	Aug. 18	Severe frost
Sultan Sweet	Aug. 30	
Stocks	July 8	"
Tagetes	No bloom	
Tropaeolum (4 varieties)	Aug. 9	
Verbena	Sept. 8	Severe frost
Zinnia	No Bloom	

The following varieties of annuals were sown in the open May 20:—

Variety.	In Bloom From.
Asters (10 varieties)	Sept. 18
Abronia umbellata	" 9
Antirrhinum	Aug. 5
Calendula	" 5
Candytuft	July 15
Clarkia (6 varieties)	Aug 21
Coreopsis	" 17
Dianthus	Sept. 8
Eschscholtzia	Aug. 1
Gaillardia	Sept. 7
Godetia	" 7
Helichrysum	Aug. 26
Iberis	July 15
Mignonette	" 27
Nicotiana	Sept. 18
Nemophila	Aug. 19
Poppy (4 varieties)	" 20
Portulaca	Sept. 4
Salpiglossis	" 7
Stocks	" 1
Tagetes	Aug. 26
Tropaeolum (3 varieties)	" 9
Verbena	" 28

SWEET PEAS.

Twenty-five varieties of sweet peas were sown May 12. Only six varieties bloomed and were too late in the season to make a display.

DAHLIAS.

A collection of dahlias were planted May 20. The following varieties bloomed:—

Maurice Rurone,
Matchless,
Flossie,
Jessie McIntosh,
Evadne,
Rosenhagen,
Countess of Lonsdale,
A. D. Levoni,
Bon Ton,
Cycle,
Capstan.

CANNAS.

A collection of cannas were planted May 22. None bloomed.

Variety.	Commenced to Bloom.
Darwin Mixture	June 2
Parrot	" 5
Picotee	" 8
Isabella	" 5
Duchesse de Parma	May 18
Joost van Vondel	" 15
Cottage Maid	" 15
Chrysolora	" 18
Couronne d'Or	" 19
Vermilion Brilliant	" 15
Keizerskroon	" 15
Artus	" 15
Pottebakker	" 15
Imperator Rubrorum	" 18
Golden Crown	June 2
Gesleriana Spathulata	" 5
Murillo	May 20

SMALL FRUITS.

Black, red and white currants fruited for the first time and have not been tested long enough to state definitely the best varieties.

Gooseberries did not fruit.

Raspberries—Early King and Sunbeam produced the most fruit. Herbert produced fruit of a fine quality and size.

Strawberries—The order of merit according to yield was Beder Wood, Haverland, and Senator Dunlap.

ORCHARD.

Several varieties of apples bloomed, amongst them being Eve, Prince and Jewel. The fruit set was blown off and did not mature.

TREE PLANTING.

A Caragana hedge was planted west of the drive from barn to the north line and on the north side of the vegetable garden and through the small fruits. A number of ornamental trees and shrubs were planted on both sides of drive from main entrance to residence.

HORSES.

During the year one of the general purpose horses died from inflammation of the bowels. The other horses are in good condition, the number on hand at the close of the year being ten. A few of the horses were wintered outside at the straw stack and in thirteen weeks one heavy team made a gain of seventy pounds in weight. They were not fed, but were watered once daily and were without shelter.

CATTLE.

Four dairy cattle are kept, namely.—Two pure-bred Jersey heifers rising three years old, one grade Shorthorn cow and one pure-bred Jersey calf. These cattle are in good condition.

FEEDING FOR BEEF.

A carload of two and three year old steers averaging 1,008 lbs, were put in the corral on November 1. For the first month the feed consisted of peas and oats cured for hay. On December 1 a three-pound per head grain ration was fed, consisting of frozen wheat one-third and barley two-thirds, ground and fed on grain tables twice daily. On January 1, the forage ration was varied by including a mixture of alfalfa and brome hay with the peas and oat sheaves. During the whole feeding period the cattle ran to the straw stacks and consumed quite a large quantity of straw, in fact, I believe they could have been carried another month without hay with added profit. The grain ration was increased one pound per head per week until ten pounds per day was reached. After having been on this ration for five weeks the ration was again increased gradually until at the finish they were eating sixteen pounds per head per day. The chop for the whole feeding period was ground at the beginning and mixed so there could be no variation in the grain mixture. They were fed altogether outside, had access to water at all times, also salt. After hay-feeding was begun the cattle had all they could eat. The alfalfa hay is charged at $12 per ton while the brome hay which was cut from a pasture and hence was not of as high quality as it would have been if from a meadow, is valued at $7 per ton. In valuing the straw only an estimate is possible as the straw was not weighed.

The total labour, including hauling of feed, pumping of water and feeding, amounted to 434 hours of manual labour and 30 hours horse labour, and cost $83.54. The interest on the money invested in the cattle from September 1 to April 1 at 8 per cent amounted to $37.37. The manure produced valued at 75 cents per ton in the yard is estimated to be sufficient to balance the labour cost and interest charge. The cattle were on pasture two months prior to November 1 and the charge for this is $20. One steer, the value of which at first cost was $40.04, and in feed $8.63, totaling $48.67, was killed because he developed a bad case of lump-jaw. After covering this loss the average profit per head, after paying for all feed at prices given, is $15.56. The plates showing the two methods of disposing of the straw-stacks are a striking reminder of the insistent claims of live stock upon the attention of the man who would combine profitable methods with true citizenship. As compared with

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The Disposal of Straw in the North-West. (2) An unprofitable way.

burning the straw farmers may market it through animals to good advantage and at the same time make possible as good crops in fifty, or a hundred, or two hundred years, as are possible from the virgin soil of to-day.

Number of steers in lot		20
First weight November 1, 1911	lbs.	20,200
First weight, average	"	1,010
Finished weight, 19 steers gross, April 3	"	24,515
Finished weight, average	"	1,290¼
Total gain in 155 days	"	5,325
Average gain per steer	"	280¼
Average daily gain per steer	"	1·8
Average daily gain per lot	"	34·2
Gross cost of feed		$ 528 89
Cost of 100 lbs. gain		9 93
Selling price 7 cts. per lb., live weight, less 5 per cent.		1,630 30
Profit on 19 steers		344 28
Profit per steer		18 12
Profit per steer after covering cost of one loss with feed.		15 56
Average value of steer at start		40 04
Average selling price per steer		85 80
Average increase in value		45 76
Average cost of feed per steer		27 84
Amount of meal eaten	lbs.	25,054
Amount of hay eaten	"	30,580
Amount of green feed eaten	"	22,000
Amount of straw eaten	"	40,000
Amount of salt eaten	"	172

BUILDINGS.

A building for the protection of the threshing separator was erected during the year. This building is twenty-seven feet long by twelve and one-half feet wide.

CORRESPONDENCE.

From April 1, 1911, to March 31, 1912, 4,501 letters were received and 4,033 answered.

MEETINGS ATTENDED.

The Station was represented at the Calgary and Edmonton Exhibitions occupying a tent on the grounds and making an exhibit of an educational nature.

I attended Institute meetings at Clive, Alix, Redwing, Bullocksville, Castor, Stettler, Red Willow, Cumberland, Blackfalds and Lacombe. I also judged and addressed meetings in connection with the Red Deer Horticultural Show, Provincial Seed Fair, Provincial Dairy Convention and judged Standing Crops Competitions at Macleod, Medicine Hat, Stony Plain and Vegerville, and the Good Farms Competition at Leduc and Nightingale. I also attended the Forestry Convention, Seed Growers' Convention, National Live Stock Association and Horticultural Convention at Ottawa in February.

ACKNOWLEDGMENT.

I have pleasure in acknowledging the painstaking and careful work of the Foreman, Mr. S. Edmunds, and others of the staff, who have given good service.

DISTRIBUTION OF SAMPLES.

Twenty-four thousand five hundred seedlings of Manitoba Maple, Caragana and Ash were distributed in the spring of 1911. There are a number ready for distribution in 1912.

There were one thousand and nine samples of potatoes distributed in the spring of 1911, together with two hundred and forty-seven sacks of inoculated soil for alfalfa.

EXTENSION.

The Minister of Agriculture, Hon. Martin Burrell, authorized the extension of this Station by the addition of about three hundred and thirty acres which adjoins the present site on the west and south. The new land was much needed to permit of live stock experimental work being carried on.

METEOROLOGICAL RECORD.

Months.	Highest Temperature. F.	Date.	Lowest Temperature. F.	Date.	Total Precipitation.	Total Hours Sunshine.
1911.						
April	76·0	21st	−11·9	4th	1·15	227·4
May	83·4	5th	24·9	26th	1·51	231·8
June	80·0	16th	34·7	6th	5·62	247·8
July	85·0	25th	33·9	8th	4·39	267·9
August	80·0	18th	29·5	27th	2·63	231·9
September	76·0	2nd	21·5	25th	2·50	176·6
October	80·5	9th	8·7	25th	·62	176·4
November	46·0	2nd	−21·6	11th	·78	107·8
December	46·0	1st	−37·6	31st	·19	86·7
1912.						
January	42·4	22nd	−46·0	10th	·76	103·5
February	46·8	16th	−23·5	29th	·20	119·3
March	54·8	31st	−20·0	2nd	·13	203·7
Totals					20·48	2,180·8

I have the honour to be, sir,
Your obedient servant,

G. H. HUTTON,
Superintendent.

EXPERIMENTAL FARM FOR BRITISH COLUMBIA.

REPORT OF P. H. MOORE, B.S.A., SUPERINTENDENT.

AGASSIZ, B.C., March 31, 1912.

J. H. GRISDALE, Esq., B. Agr.,
Director, Dominion Experimental Farms,
Ottawa.

SIR,—I have the honour to present herewith the report of the Experimental Farm at Agassiz, B.C., for the year ending March 31, 1912.

The month of April, 1911, was very clear, bright and mild, with but three or four light frosts. The weather turned wet in May and the spring was late but free from the high winds which usually prevail at that season of the year. The summer was on the whole a favourable one; the weather was hot and dry in July and August; the autumn was also dry and exceptionally fine. The winter, although not cold, was wet and there were two severe blizzards, one in November and the other in January. In the November storm, the wind commenced blowing from the north on November 8, increasing to a gale, and ended on the 12th, with two feet of snow, which drifted into heaps. This was followed by rain and a somewhat open month in December followed again by a cold spell in January with snow, which, although the weather was not so cold as in December, remained on the ground for two weeks. February was mild, all the snow disappeared and the ground dried out sufficiently for ploughing to be done. March was an exceptionally fine month, affording an opportunity for much outside work to be done.

TESTS OF VARIETIES OF CEREALS, ROOTS, INDIAN CORN AND POTATOES.

In 1911, there were tested at the Experimental Farm at Agassiz, ten varieties of spring wheat, fifteen varieties of oats, ten varieties of six-row barley, eight varieties of two-row barley, twelve varieties of field peas, nine of Indian corn for ensilage, ten varieties of turnips, eight varieties of mangels, five of field carrots, three of sugar beets and twenty-four varieties of potatoes, of which seventeen are here reported on. The variety tests of grains were conducted this year on land which had grown corn the previous year and had then been disced without ploughing, which did not give as good results as if the land has been ploughed. The roots were grown on clover sod, spring-ploughed land of a sandy loam character. The corn was grown on spring-ploughed rye grass sod. All these were grown without manure. The grains were treated with formaldehyde for the prevention of smut, the strength of the solution being one pint of formaldehyde to forty gallons of water, the grain being soaked therein for twenty minutes and then dried out on the barn floor. The corn was warmed in warm water and about a tablespoonful of pine tar per half-bushel added and stirred into it to keep the crows from picking the seed. The plots of wheat, oats, barley and peas were each 1/60 of an acre and the yields of Indian corn, roots and potatoes were calculated from the product of two 66-foot rows in each case.

Spring Wheat—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.
					In.		In.	Lbs.	Bush. Lbs.
1	Red Fife	Apr. 15	Aug. 14	121	43	10	3·25	1,290	21 30
2	Early Red Fife (Ottawa)	" 15	" 12	119	43	10	3·25	1,380	23 ..
3	Huron	" 15	" 11	118	40	10	3·75	1,080	18 ..
4	Stanley	" 15	" 10	117	46	10	3	1,650	27 30
5	Preston	" 15	" 10	117	42	10	4	1,380	23 ..
6	Bishop	" 15	" 15	122	41	10	3	1,380	23 ..
7	Chelsea	" 15	" 15	122	43	10	3·5	1,260	21 ..
8	Pringle's Champlain	" 15	" 14	121	46	10	3·25	1,380	23 ..
9	White Fife	" 15	" 13	120	40	10	3·5	960	16 ..
10	Marquis	" 15	" 9	116	42	10	3·5	1,140	19 ..

Oats—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.
					In		In.	Lbs.	Bush. Lbs.
1	Swedish Select	Apr. 15	Aug. 5	112	46	10	10	1,560	45 30
2	Abundance	" 15	" 8	115	47	10	11	1,680	49 18
3	Regenerated Abundance	" 15	" 8	115	48	10	11	1,650	48 18
4	Improved American	" 15	" 9	116	46	10	10	1,740	51 06
5	Irish Victor	" 15	" 7	114	47	9	10	1,560	45 30
6	Danish Island	" 15	" 10	117	44	8	9	1,770	52 02
7	Siberian	" 15	" 8	115	46	10	10	1,920	56 16
8	Banner	" 15	" 10	117	49	9	9	1,960	57 22
9	White Giant	" 15	" 8	115	42	10	10	1,740	51 06
10	Pioneer (Black)	" 15	" 5	112	42	8	9	2,100	61 26
11	20th Century	" 15	" 5	112	40	9	10	1,680	49 14
12	Gold Rain	" 15	" 7	114	41	8	9	1,830	53 28
13	Thousand Dollar	" 15	" 9	116	43	9	10	1,500	44 04
14	Lincoln	" 15	" 8	115	46	10	10	2,130	62 22
15	Improved Ligowo	" 15	" 7	114	42	10	10	1,920	56 16

Six-Row Barley—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	
					Ins.		Ins.	Lbs.	Bush.	Lbs.
1	Trooper	April 15	Aug. 3	110	38	8	3	1,500	31	12
2	Manchurian	" 15	July 28	104	40	9	3	1,410	29	18
3	O. A. C. No. 21	" 15	" 28	104	42	8	3	1,320	27	24
4	Nugent	" 15	" 31	107	40	8	2.5	1,440	30	..
5	Stella	" 15	Aug. 7	114	41	9	3	1,560	32	24
6	Yale	" 15	July 31	107	44	10	3	1,320	27	24
7	Mensury	" 15	" 31	107	43	9	3	1,380	28	36
8	Mansfield	" 15	" 31	107	41	9	3·5	1,680	35	..
9	Odessa	" 15	" 28	104	38	8	2·5	1,770	36	42
10	Oderbruch	" 15	" 28	104	43	9	3	1,650	34	18

Two-Row Barley—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Ripening.	Number of Days Maturing.	Average Length of Straw including Head.	Strength of Straw on a scale of 10 points.	Average Length of Head.	Yield of Grain per Acre.	Yield of Grain per Acre.	
					Ins.		Ins.	Lbs.	Bush.	Lbs.
1	Swedish Chevalier	April 15	Aug. 5	112	45	10	4	1,860	38	36
2	Danish Chevalier	" 15	" 7	114	44	8	5	1,620	33	36
3	Standwell	" 15	" 5	112	45	10	5	1,950	40	30
4	Clifford	" 15	" 4	111	40	9	3·5	1,740	36	12
5	Canadian Thorpe	" 15	" 7	114	47	10	4	1,620	33	36
6	Hannchen	" 15	" 3	110	46	9	4	1,590	33	06
7	Beaver	" 15	" 7	114	41	9	4	1,680	35	..
8	Invincible	" 15	" 9	116	46	10	5	1,770	36	42

Peas—Test of Varieties.

Number.	Name of Variety.	Size of Pea.	Date of Sowing.	Date of Ripening.	No. of Days Maturing.	Average Length of Straw.	Average Length of Pod.	Yield of Grain per Acre.	Yield of Grain per Acre.
						In	In.	Lbs.	Bush. Lbs
1	Prince	Medium	Apr. 20.	Aug. 17.	119	48	3·5	1,440	24 00
2	English Grey	"	" 20.	" 14.	116	53	3·0	1,320	22 00
3	Mackay	"	" 20.	" 16.	118	50	3·5	1,800	30 00
4	White Marrowfat	Large	" 20.	" 15.	117	53	3·0	1,530	25 30
5	Black-eye Marrowfat	"	" 20.	" 18.	120	54	3·5	1,560	26 00
6	Arthur Selected	Medium	" 20.	" 13.	115	50	3·25	1,440	24 00
7	Prussian Blue	"	" 20.	" 14.	116	59	2·75	1,620	27 00
8	Picton	"	" 20.	" 14.	116	53	3·0	1,620	27 00
9	Chancellor	Small	" 20.	" 10.	112	48	2·25	1,770	29 30
10	Golden Vine	"	" 20.	" 17.	119	51	2·25	1,560	26 00
11	Daniel O'Rourke	"	" 20.	" 12.	114	50	2·5	1,440	24 00
12	Paragon	Large	" 20.	" 14.	116	49	3·0	1,380	23 00

Indian Corn for Ensilage—Test of Varieties.

Number.	Name of Variety.	Date of Sowing.	Date of Cutting.	Average Height.	Condition when Cut.	Weight per Acre Grown in Rows.		Weight per Acre Grown in Hills.	
				Ins.		Tons.	Lbs.	Tons.	Lbs.
1	Champion White Pearl	May 29	Oct. 9	94	Early Milk	18	1,185	13	15
2	Selected Leaming	" 29	" 8	86	"	15	1,570	16	1,550
3	Longfellow	" 29	" 9	82	Roasting ears	17	650	18	905
4	Early Mastodon	" 29	" 9	96	No ears formed	15	1,185	15	1,515
5	Wood's Northern Dent	" 29	" 8	80	Ears formed	16	10	16	1,660
6	Eureka	" 29	" 8	79	In Silk	16	505	17	329
7	Angel of Midnight	" 29	" 9	91	Early Milk	16	1,880	17	1,255
8	Compton's Early	" 29	" 9	88	"	17	1,945	18	1,620
9	Superior Fodder	" 29	" 9	85	No ears formed	14	215	15	1,515

Sugar Beets—Test of Varieties.

Number.	Name of Variety.	Yield per Acre. 1st Sowing.		Yield per Acre. 1st Sowing.		Yield per Acre. 2nd Sowing.		Yield per Acre. 2nd Sowing.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Vilmorin's Improved	8	1,820	297		9	1,272	321	12
2	French Very Rich	7	1,972	266	12	7	1,312	255	12
3	Klein Wanzleben	8	1,028	283	48	7	784	246	24

MANGELS—Test of Varieties.

Number.	Name of Variety.	Yield per Acre 1st Sowing.		Yield per Acre 1st Sowing.		Yield per Acre 2nd Sowing.		Yield per Acre 2nd Sowing.	
		Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
1	Prize Mammoth Long Red	9	1,800	330	00	7	784	246	24
2	Gate Post	19	280	638	..	17	1,772	596	12
3	Giant Yellow Globe	12	1,872	431	12	11	1,496	391	36
4	Giant Yellow Intermediate	11	1,892	391	36	9	1.800	330	00
5	Perfection Mammoth Long Red	13	1.984	464	24	12	156	402	36
6	Half Sugar White	20	1,316	688	36	15	1,152	519	12
7	Yellow Intermediate	15	1,152	519	12	13	1.720	426	00
8	Selected Yellow Globe	11	704	378	24	9	1,800	330	00

TURNIPS (FIELD)—Test of Varieties. (Both plots pulled Oct. 28.)

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
			Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Carter's Elephant	June 5..	June 19..	10	1,780	363	..	9	348	3 5	48
Perfection Swede	" 5..	" 19..	13	1,192	453	12	11	1.100	385	..
Magnum Bonum	" 5..	" 19..	14	1,040	484	..	15	1,492	524	59
Hall's Westbury	" 5..	" 19..	12	1,344	422	2	15	96	501	36
Halewood's Bronze Top	" 5..	" 19..	14	1,568	492	48	13	1,720	462	..
Bangholm Selected	" 5..	" 19..	13	796	446	36	12	1,476	424	36
Hartley's Bronze	" 5..	" 19..	13	1,456	457	36	15	1,020	517	..
Mammoth Clyde	" 5..	" 19..	14	1,040	484	..	12	288	404	48
Good Luck	" 5..	" 19..	15	624	510	24	9	1.272	321	12
Jumbo	" 5..	" 19..	13	796	446	36	9	1,668	327	48

CARROTS—Test of Varieties. (Both plots pulled Oct. 25.)

Name of Variety.	1st Plot Sown.	2nd Plot Sown.	Yield per Acre. 1st Plot.		Yield per Acre. 1st Plot.		Yield per Acre. 2nd Plot.		Yield per Acre. 2nd Plot.	
			Tons.	Lbs.	Bush.	Lbs.	Tons.	Lbs.	Bush.	Lbs.
Half Long Chantenay	May 3.	May 17..	15	1,152	519	12	17	1,904	398	24
Mammoth White Intermediate	" 3..	" 17..	25	424	844	..	20	1,184	686	24
Ontario Champion	" 3..	" 17..	20	1,184	686	24	20	392	673	12
White Belgian	" 3..	" 17..	23	1,256	787	36	20	1,712	693	12
Improved Short White	" 3..	" 17..	27	1,308	921	48	26	1,064	884	24

POTATOES—Test of Varieties. (Planted May 11, Dug Sept. 20.)

Name of Variety.	Average Size.	Quality.	Total Yield per Acre.		Yield per Acre of Sound.		Yield per Acre of Market-able.		Yield per Acre of Un-market-able.		Form and Colour
			Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	Bush.	Lbs.	
Carman No. 1	Medium	Good	343	12	343	12	247	24	95	57	Round White.
Reeves' Rose	"	Fair	459	6	459	6	367	17½	91	48½	Oval Reddish.
Morgan Seedling	Large	"	354	12	354	12	301	.	53	12	Long Pink.
Rochester Rose	Medium	Good	294	48	294	48	235	20	59	28	Long Rose.
Vick's Extra Early	Small	Fair	182	36	182	36	127	24	55	12	Oblong Pink.
Empire State	Large	"	305	48	305	48	259	15	46	33	Long White.
Irish Cobbler	Small	Good	310	12	310	12	232	30	67	42	Round White.
Dalmeny Beauty	Large	Fair	443	14	443	14	381	00	62	14	Oblong White.
Late Puritan	Medium	Good	327	48	327	48	268	9	59	39	Long White.
Factor	"	Poor	138	36	138	36	104	53	33	43	" "
Ashleaf Kidney	"	Good	347	36	347	36	305	20	42	16	Oblong White,
Everett		Fair	393	48	393	48	330	7	63	41	Long Reddish.
Money Maker	Small	Good	369	36	369	36	324	45	44	51	Long White.
Hard to Beat	"	Fair	134	12	134	12	100	30	33	42	" "
Gold Coin	Medium	Good	444	24	444	24	390	43	53	41	Oval White.
American Wonder	Large	"	380	36	380	36	326	48	53	48	Oblong White.
Dreer's Standard	Medium	Fair	313	24	313	24	256	36	56	58	Round White.

TEST OF INDIAN CORN GROWN IN ROWS AT DIFFERENT DISTANCES APART.

(Each grown in four rows 66 feet long.)

Distance Apart of Rows.	Variety.	Weight in Drills Per Acre.		Weight in Hills Per Acre.	
		Tons.	Lbs.	Tons.	Lbs.
21"	Champion White Pearl	29	699	29	1302
	Selected Leaming	28	1322	29	1773
	Longfellow	30	999	30	1464
28"	Champion White Pearl	19	177	18	902
	Selected Leaming	20	1931	21	1985
	Longfellow	27	1189	27	1781
35"	Champion White Pearl	15	1185	13	15
	Selected Leaming	15	1570	16	1550
	Longfellow	17	650	18	905
42"	Champion White Pearl	12	512	10	317
	Selected Leaming	12	1859	14	991
	Longfellow	14	331	14	943

For silage the Longfellow was far in advance of the other varieties. The corn sown the two shortest distances apart, twenty-one and twenty-eight inches, although giving a heavier yield per acre, had much thinner stalks, filled with water, making it of much less value than the corn sown at thirty-five and forty-two inches apart. There were only a few stalks in the two former cases which tasselled out, with no sign of ears. The thirty-five and forty-two inch rows and hills has ears fairly well developed.

The labour of cultivating was very much greater in the drills than in the hills, and that required to cultivate the corn when sown at the shorter distances apart was too great to be practicable.

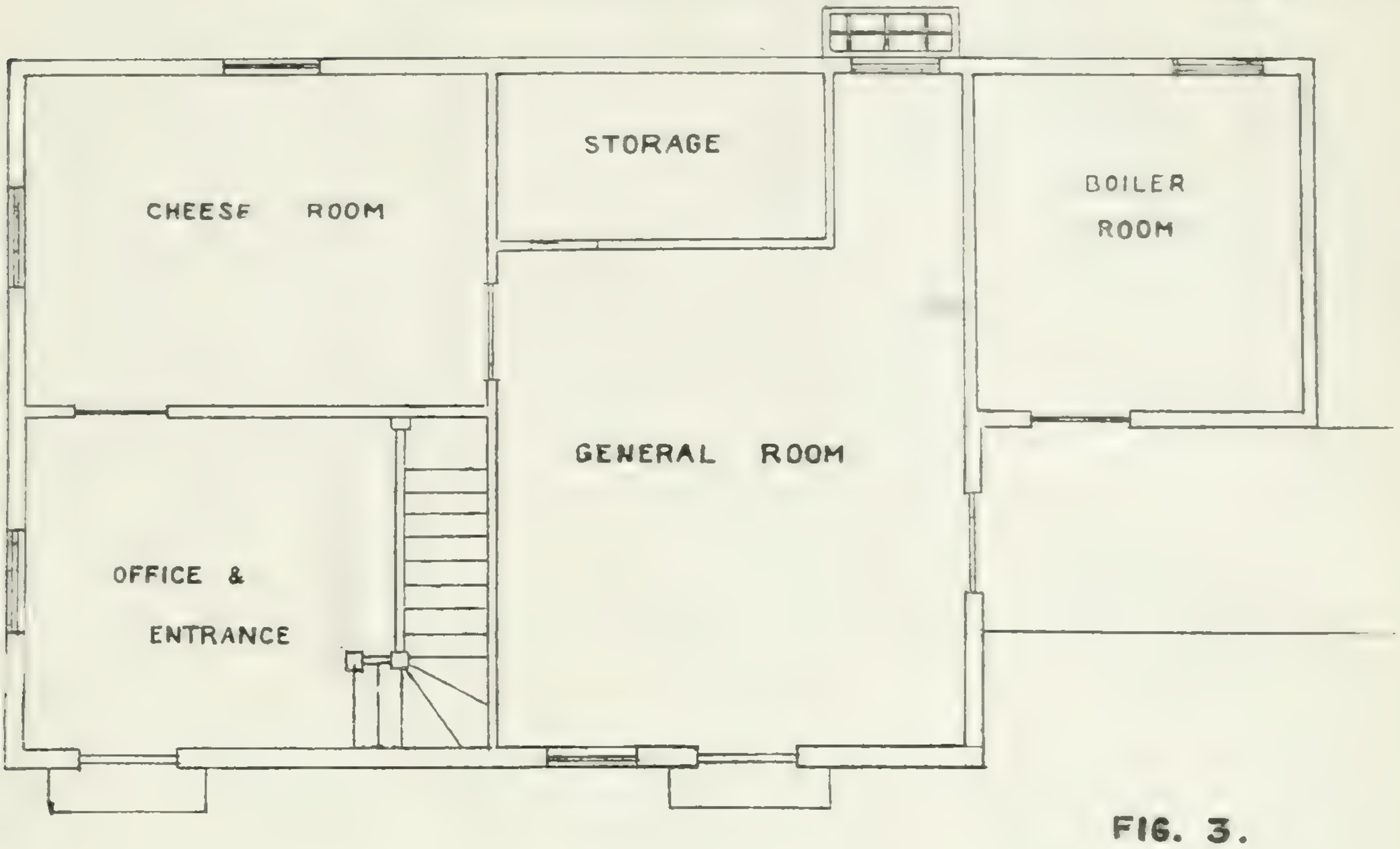
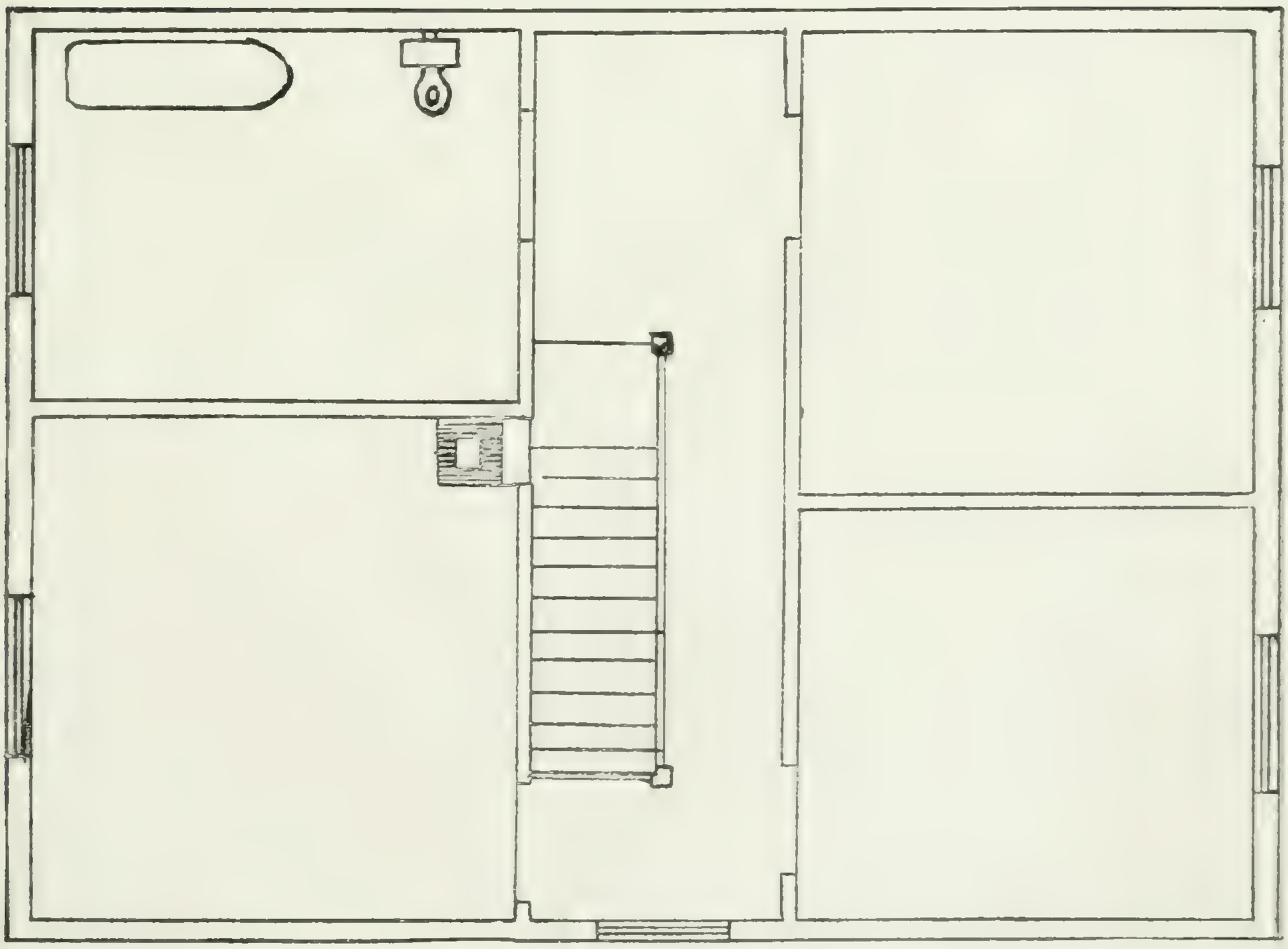


FIG. 3.

Ground Floor.



First Floor.

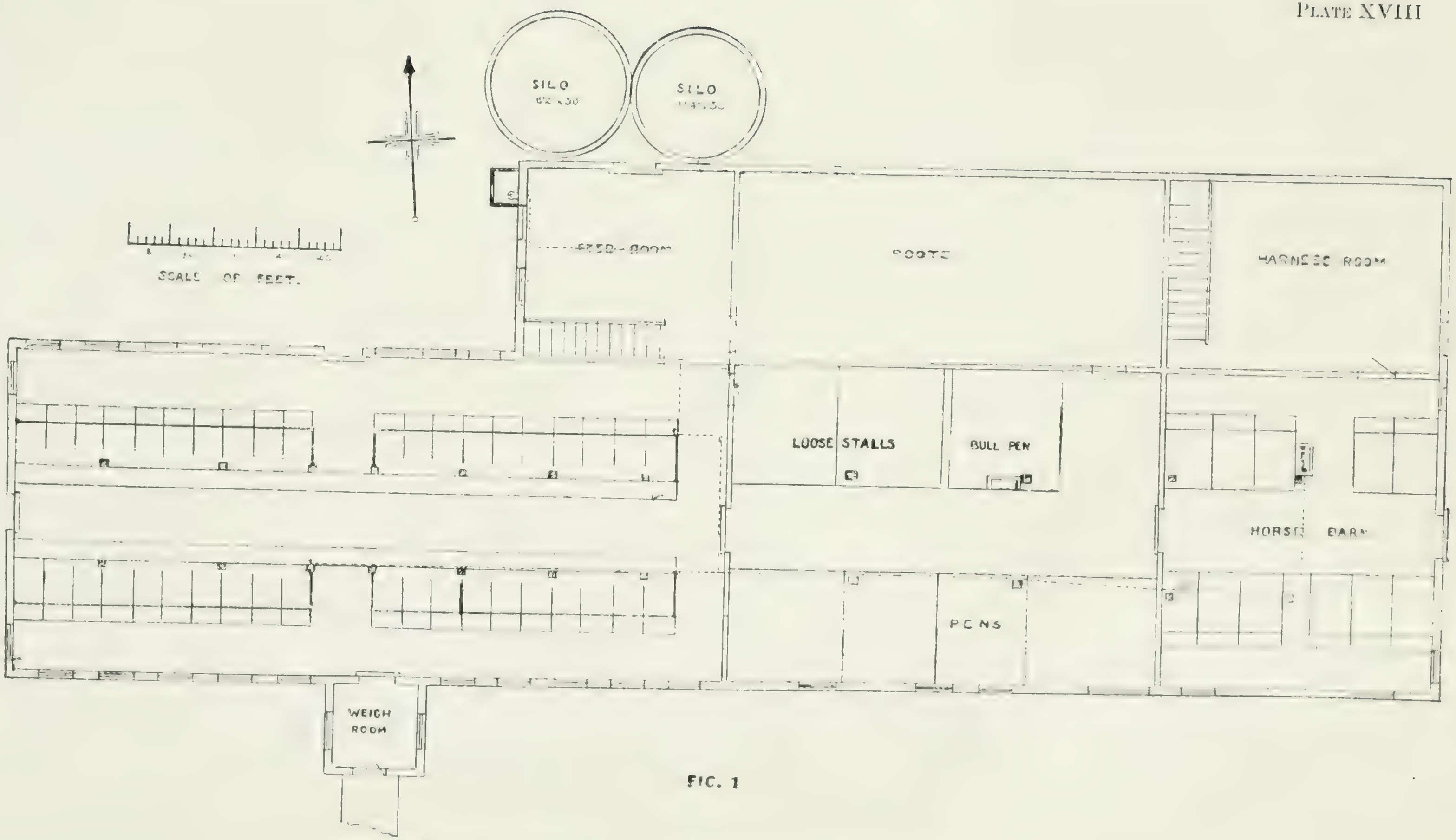
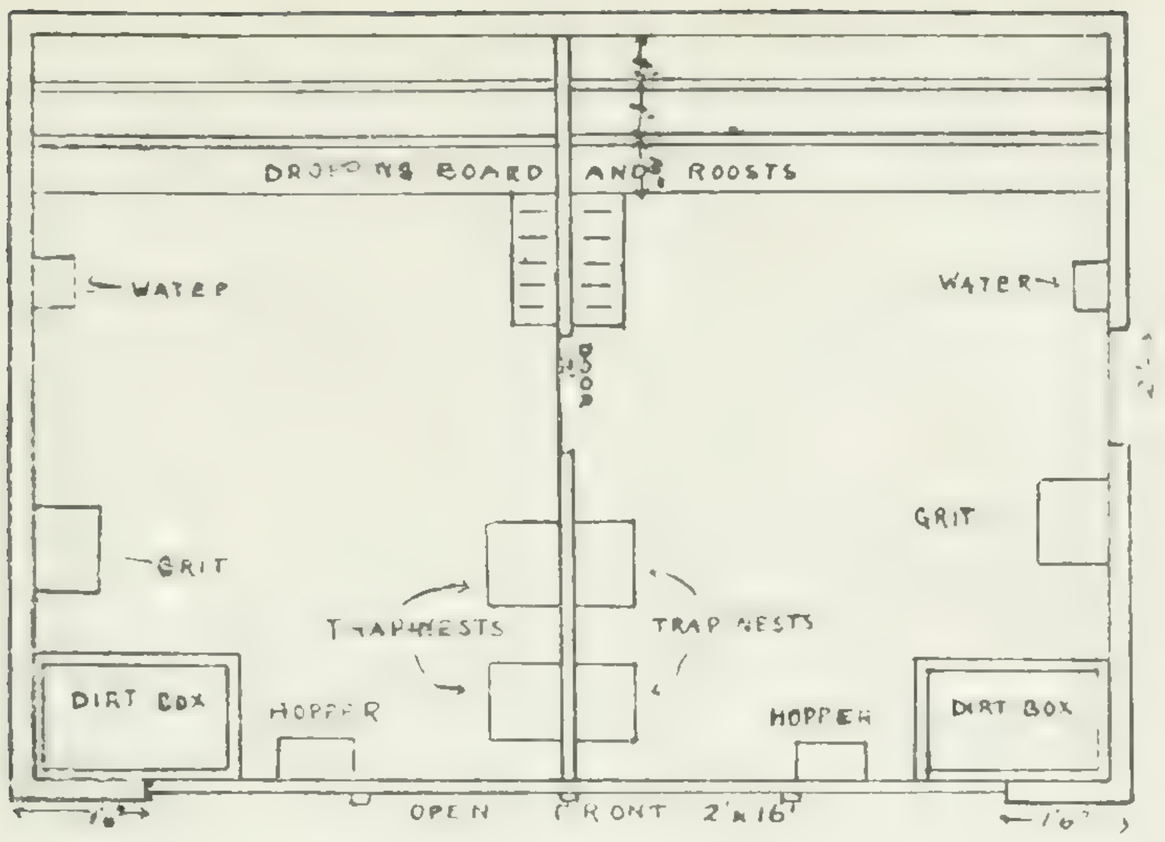


FIG. 1

Ground Floor Plans of Cattle and Horse Barns, Experimental Farm, Agassiz, B.C.



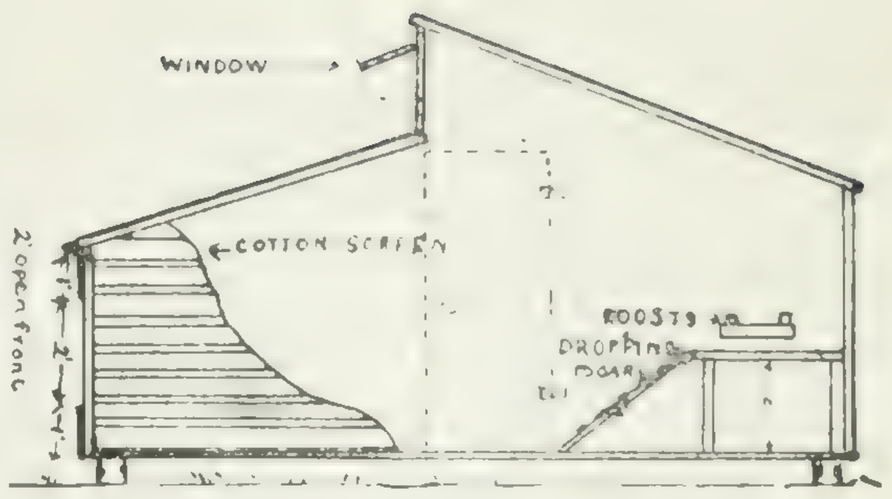
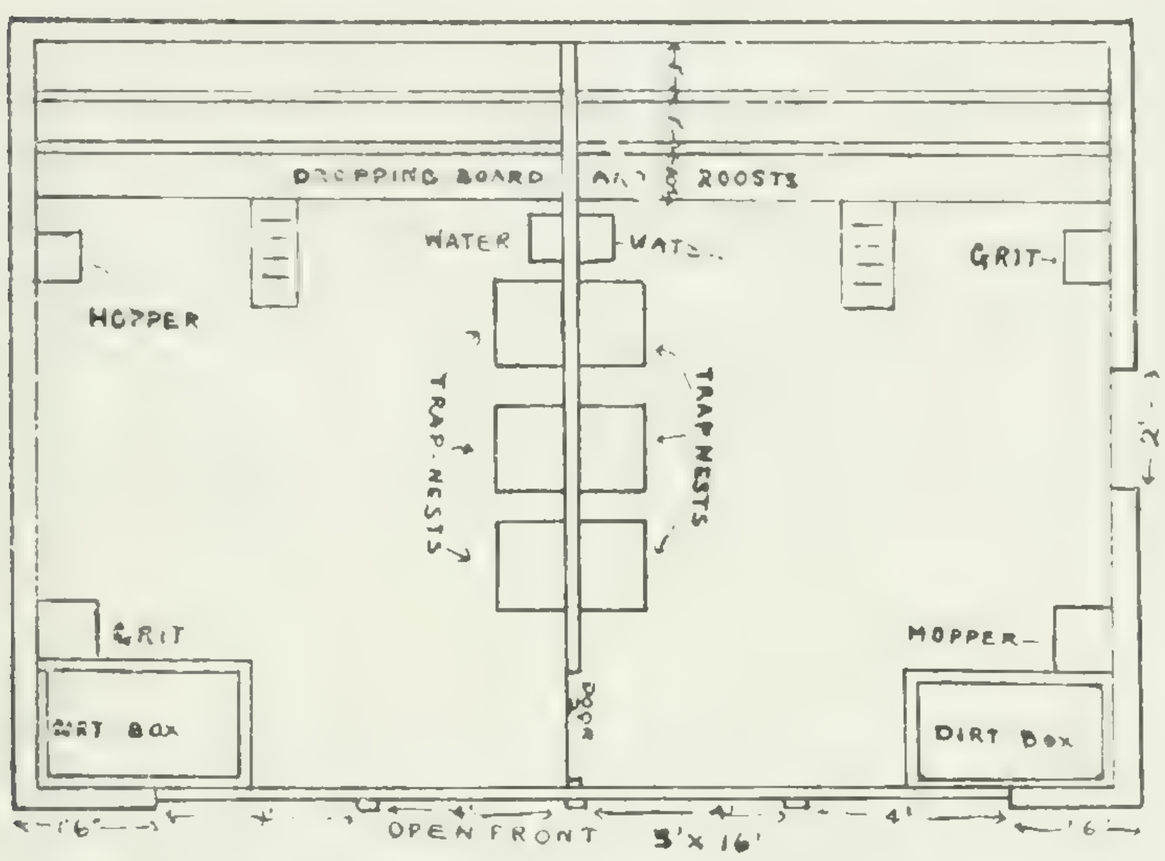


FIG. 1



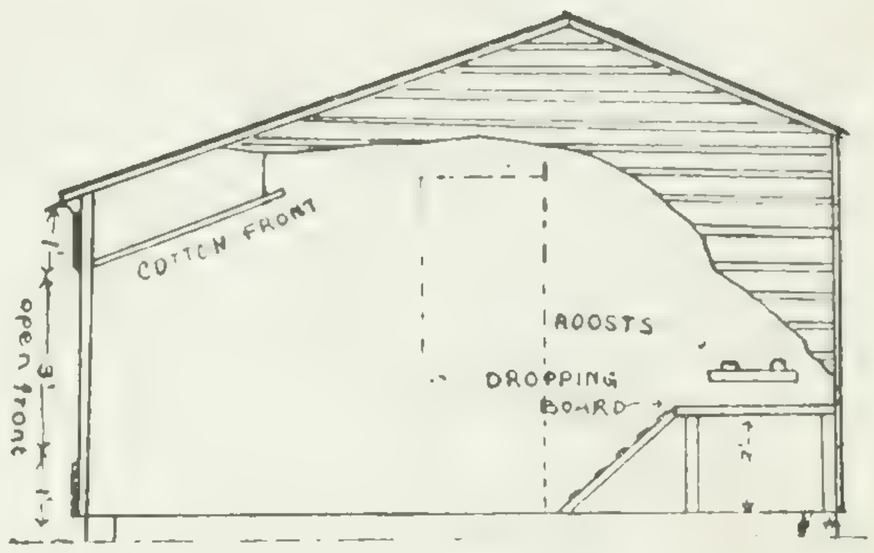
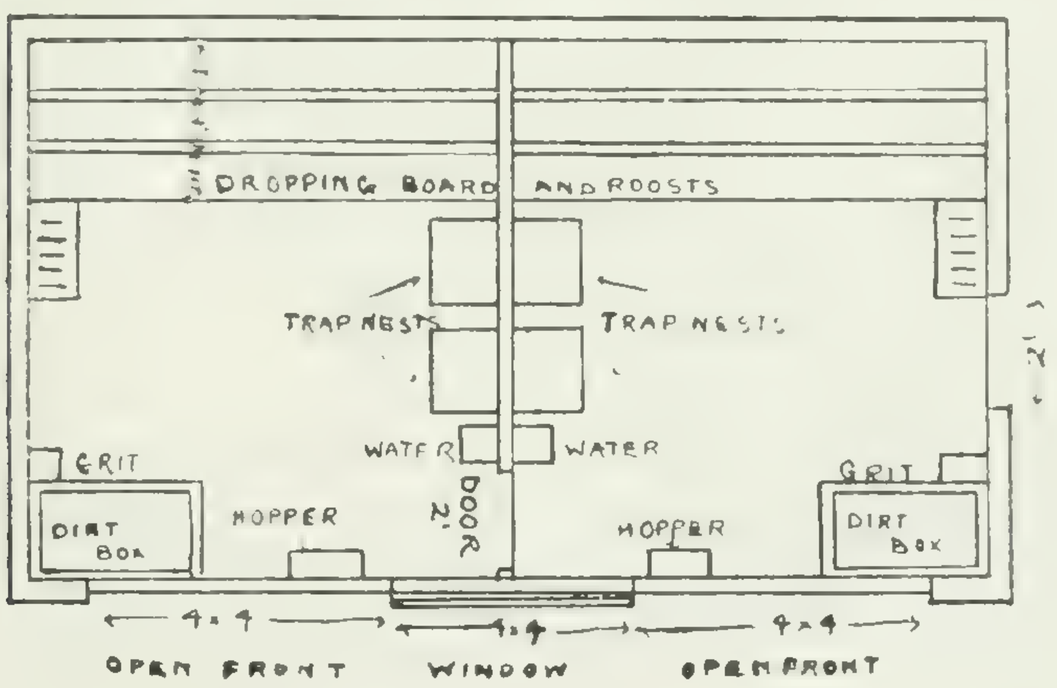


FIG. 2



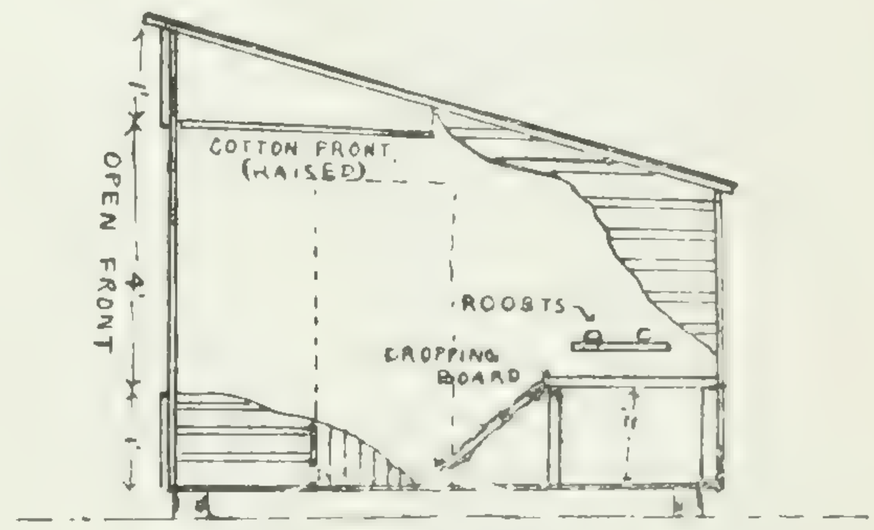


FIG. 3

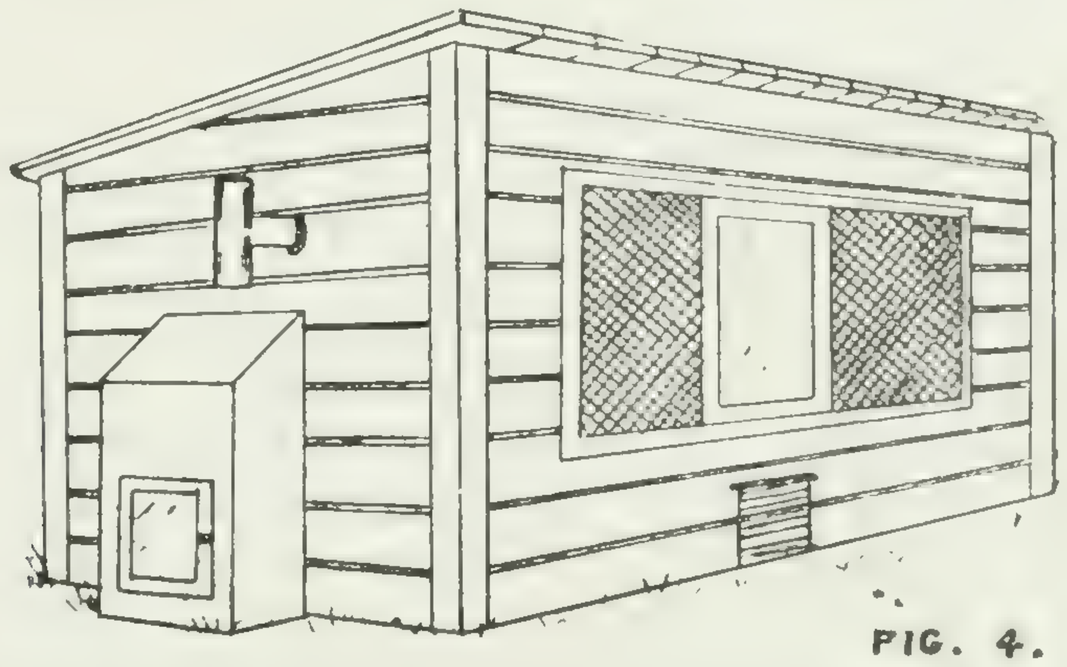
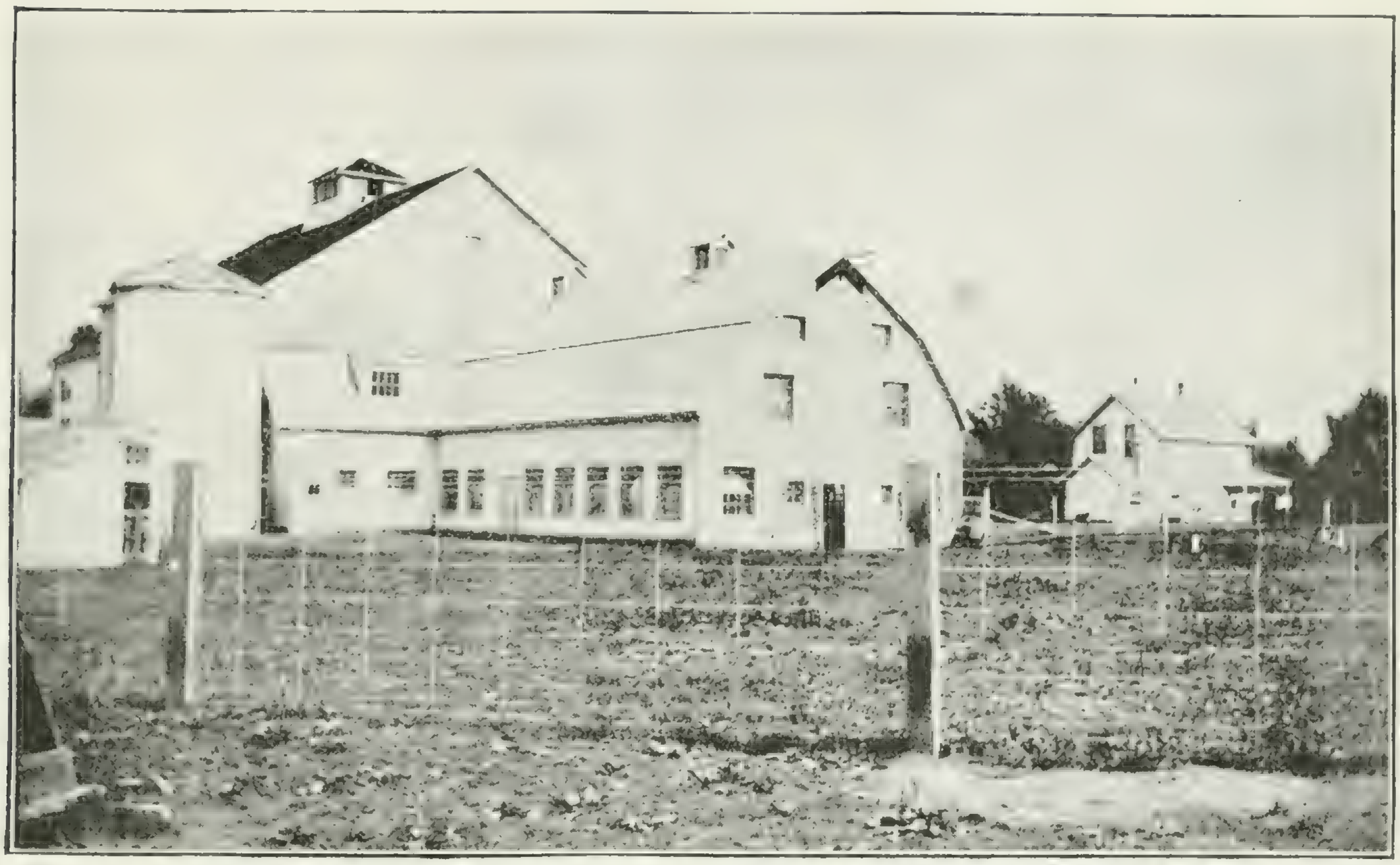
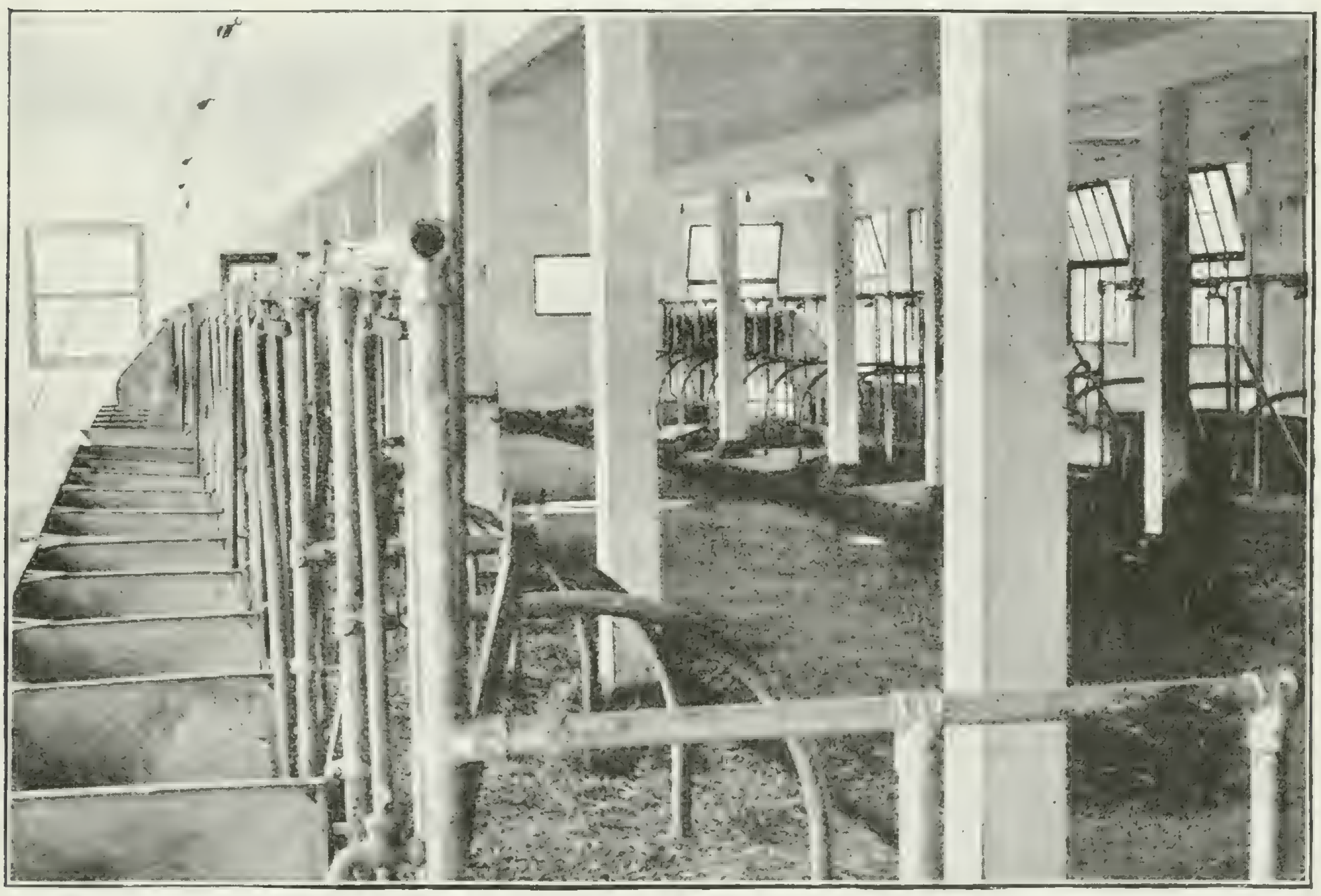


FIG. 4.

Four Types of Poultry House in use on the Experimental Farm, Agassiz, B.C.



Group of Farm Buildings and Dairy, Experimental Farm, Agassiz, B.C.



Interior of Cow Barn, Experimental Farm, Agassiz, B.C.

FARM ROTATION.

An attempt is being made to get the whole Farm under a four-year rotation and also to get it divided into four as nearly equal sections as possible, both in respect to the cleared and uncleared land. Under the orchard system practised heretofore, this was impossible and as a result, some parts of the Farm are very poor in fertility. For this season, the land in some of the sections varied greatly, the supply of manure available was small and the crops were not what they should have been. The coming year should show some improvement, but not much can be expected, as the cattle referred to further on in this report came late and all the hoed crops are on land that has never been manured. When the cycle of the rotation has once been completed, results should be much more favourable. This four-year rotation is as follows:—

First year.—Grains, seeded down to Red Alsike, White Dutch clover and Rye grass.

Second year.—Hay.

Third year.—Pasture. In fall plough early and late, cultivate, manure.

Fourth year.—Hoed crops. Mangels, corn, potatoes.

The hoed crops on the Agassiz Farm are chiefly corn, mangels and potatoes. In corn, Longfellow and Angel of Midnight do best, and are usually planted in checks three feet each way. In mangels, Mammoth Red and Giant Half Sugar White are preferred. About twenty-four varieties of potatoes are grown for sale and a small acreage for distribution.

As a main grain crop, a mixture of oats, peas, barley and wheat is sown. Last year, these were mixed in the proportion by measure of 4, 1, 1, 1, in the order named above and sown at the rate of 2½ bushels per acre. Good results were obtained and the same mixture will be used again, but, in the meantime, an experiment will be carried on with some plots of different mixtures so as to learn which is best suited to our local conditions. In seeding down, 9 lbs. Common Red clover, 3½ lbs. Alsike and 1½ lbs. white Dutch clover along with 1 lb. Italian rye grass were used, per acre. This mixture was tried last season and gave a much thicker stand for hay or pasture than Common Red clover and Rye grass alone.

The greatest difficulty here in the farm operations is the shortage of manure which, however, will be overcome in time, as this year from the time the cattle came in December until March 31, we got one hundred and thirty-five tons fifteen hundred and eighty-five lbs. from the cows, calves and horses.

SUMMARY OF CROPS.

	Tons.	Lbs.
Hay, mixed	106	1730
Roots—		
Mangels	26	1400
Carrots	3	800
Beets	2	400
Turnips	12	500
Potatoes	4	1600
Corn for silage	207	1530
Grain—		Bush.
Peas		183½
Barley		45
Wheat		73
Seed oats		127
Mixed peas, oats and barley and wheat		705
		1133½

Part of the hay was Red clover, Italian Rye and Orchard grass. About 27 tons were taken from an old pasture field which had a light mixture of clover, rye grass, native grasses, ferns and weeds.

VEGETABLES.

During the past season the vegetable work at this Farm did not receive the attention that perhaps it should, as we had to depend entirely upon unskilled labour. The spring was cold, and the summer dry, and not conducive to the growing of large crops, especially when only very ordinary attention could be given this branch of the work. The cabbages, cauliflower, Brussels sprouts and turnips were almost entirely eaten by white maggots, and only a very few heads matured. The citrons and watermelons and also the peppers did not mature at all.

Vegetable and date of Harvesting.	Variety.	Received from	Date of Sowing.	Date of Germination.	Ready for Use.	Quantity Sown.	Amount Harvested.
Onions, October 21, 1911.	Yellow Globe Danvers	Vilmorin	April 22	May 13		60 ft.	3¼ lbs.
	Johnson's Dark Red Beauty	Johnson	" 22	" 13		60 "	6½ "
	Yellow Globe Danvers	Ont. Seed Co.	" 22	" 13		60 "	1½ "
	Salzer's Wethersfield	Salzer	" 22	" 13		60 "	9 "
	Large Red Wethersfield	Ont. Seed Co.	" 22	" 11		60 "	3 "
	Southport Red Globe	Ont. Seed Co.	" 22	" 11		60 "	5½ "
	Large Red Wethersfield	Vilmorin	" 22	" 13		60 "	13 "
Radishes. June 17, 1911	Rosy Gem	Ont. Seed Co.	" 22	" 5	June 1	30 "	8 oz.
	Non plus ultra	Ont. Seed Co.	" 22	" 5	" 1	30 "	1¼ lbs.
	Forcing Turnip Scarlet	Vilmorin	" 22	" 5	" 1	30 "	1¼ "
	White Icicle	Ont. Seed Co.	" 22	" 5	" 1	30 "	2 lb. 6 oz.
	Turnip, Early Scarlet, White Tipped	Vilmorin	" 22	" 5	" 10	30 "	1 " 13 "
Lettuce, July 22, 1911 to August 9, 1911	Grand Rapids	Ont. Seed Co.	" 22	" 9		15 "	Did not germinate.
	Hanson	Ont. Seed Co.	" 22	" 6	Aug. 9	15 "	5 lbs.
	May King	Ont. Seed Co.	" 22	" 6		15 "	Seeded before fit for market.
	Improved Hanson	Thorburn	" 22	" 20	" 3	15 "	4½ lbs.
	Black Seeded Simpson	Thorburn	" 22	" 20		15 "	Did not germinate.
	Crisp as Ice	Vicks 1911	" 24	" 5	July 28	15	7½ lbs.
	Giant Crystal Head	Thorburn	" 24	" 5	" 22	15 "	6½ lbs.
	Grand Rapids	Thorburn	" 24	" 5	" 19	15 "	6½ "
	Iceberg	Burpee	" 24	" 5	" 19	15 "	6½ "
	Wheeler's Tom Thumb	Vilmorin	" 24	" 5	" 29	15 "	6½ "
	Red Edged Victoria	Vilmorin	" 24	" 6	" 22	15 "	4¼ "
	All Heart	Dreer	" 24	" 6	" 22	15 "	6¾ "
	Cos Trianon	Vilmorin	" 24	" 6	" 22	15 "	10 "
Turnips	One variety planted, entirely destroyed by maggots.						

Vegetable and date of Harvesting.	Variety.	Received from	Date of Sowing.	Date of Germination.	Ready for Use.	Quantity Sown.	Amount Harvested.
Parsley.....	Double Curled.....	Thorburn.	April 27..	May 30..	.....	30 "	Not harvested, but very good yield.
	Double Curled.....	Thorburn.	" 19..	" 30..	.....	30 "	
Carrots, October 21, 1911.	Ox Heart.....	Ont. Seed Co.....	April 24..	" 20..	Sept. 1..	30 "	26 lbs.
	Chantenay.....	Ont. Seed Co. ...	" 24..	" 20..	" 1..	30 "	18 "
	Half Long Chantenay	Vilmorin..	" 24..	" 20..	" 1..	30 "	67 "
	Nantes.....	Ont. Seed Co. ...	" 24..	" 20..	" 1..	30 "	15 "
	French Horn.....	Vilmorin..	" 24..	" 20..	" 1..	30 "	40 "
Beets, Oct. 21, 1911	Meteor.....	Johnson. .	" 24..	" 13 .	" 1..	30 "	40 "
	Black Red Ball.....	Burpee. ..	" 24..	" 18..	" 1..	30 "	19 "
	Ruby Dulcet.....	Johnson. .	" 24..	" 13..	" 1..	30 "	55 "
	Eclipse.....	Ont. Seed Co	" 24..	" 18..	" 1..	30 "	48 "
	Egyptian.....	Ont. Seed Co.	" 24..	" 18..	" 1..	30 "	55 "
	Early Blood Red Turnip.....	Vilmorin..	" 24..	" 18..	" 1..	30 "	44 "
	Egyptian Dark Red Flat..	Vilmorin..	" 24..	" 18..	" 1..	30 "	12 "
Parsnips, October 21, 1911.	Hollow Crown.....	Graham...	" 24..	" 6..	" 1..	30 "	17 "
	Hollow Crown.....	Ont. Seed Co.	" 24..	" 6..	" 1..	30 "	30 "

Vegetable and Date of Harvesting.	Variety.	Received from.	Date of Sowing.	Date of Germination.	Quantities Planted.	Number of Pickings.	Amount Harvested
					Feet.		Lbs. Oz.
Beans— July 18, 1911 to Sept. 30, (All Dwarf Varieties). ..	Refugee....	Ont. Seed Co	April 24..	May 17...	30	6	26 10
	Refugee or 1000 to 1.	Henderson..	" 24..	" 17...	30	7	28 14
	Davis Wax.....	Ont. Seed Co	" 24..	" 17...	30	6	8 31
	Red Valentine.....	"	" 24..	" 17...	30	7	13 11
	Stringless Green Pod	Burpee.	" 24..	" 13...	30	6	10 2
	Wardwell's Kidney..	Ont. Seed Co	" 24.	" 13...	30	1	1 10
	Challenge Blackwax.	C.E.F., 1911	" 24..	" 13...	30	7	6 14
	Hodson Wax.....	Ont. Seed Co	" 24..	" 17...	30	8	14 12
	Flageolet or Giant Wax.	"	" 24..	" 17...	30	7	10 4
	Valentine	Torburn....	" 25..	" 17...	30	9	16 1
	Wardwell's Kidney Wax.....	"	" 25..	" 17...	30	3	2 6
	Early Refugee.....	"	" 25..	" 17...	30	7	10 10

Vegetable and Date of Harvesting.	Variety.	Received from.	Date of Sowing.	Date of Germination.	Date of Blooming.	Quantities Planted.	Number of Pickings.	Amount Harvested.	
						Feet.		Lbs.	Oz.
Peas — July 10 1911, to August 12 1911..	McLean's Advancer.	Thorburn..	April 25	May 6.	June 18	30	6	8	10
	Sutton's Excelsior..	Dreer ...	" 25	" 6.	" 10	30	5	7	6
	Thomas Laxton....	Bovee..	" 25	" 6..	" 10	30	3	[illegible]	1
	Stratagem..	Thorburn ...	" 25	" 6..	" 24	30	5	[illegible]	7
	Gregory's Surprise..	Gregory....	" 25	" 6..	" 10	30	3	8	3
	Premium Gem.. ...	Thorburn ..	" 25	" 6 .	" 10	30	4	8	4
	Juno	" .	" 25	" 6.	" 24	30	5	7	14
	Telephone..	" ...	" 25	" 6..	" 24	30	4	4	2
	American Wonder..	" ..	" 25	" 6..	" 12	30	5	6	5
	Heroine..	" ..	" 25	" 6.	" 24	30	7	9	12
	Gradus.	Burpee.....	" 25	. . .	" 10	30	3	6	11
	Chinese Golden....	.....	" 22	May 1..	" 19	30	1	1	8

Vegetable and Date of Harvesting.	Variety.	Received from.	Date of Sowing.	Date of Germination.	Date of Blooming.	Amount Planted.		Height.		Amount Harvested.	
						hills.	ft.	Ft.	In.	Lbs.	Oz.
Sweet Corn— Sept. 18 1911											
1	Golden Bantam.....	Burpee.	May 22	June 1..	July 25	20	60	4	2	16	0
2	Early Evergreen....	Dreer	" 22	" 1	" 27	20	60	5	6	15	19
	Black Mexican.....	Rennie.	" 22	" 1..	Aug. 7	20	60	5	6		
	Stowell's Evergreen.	Graham. ...	" 22	" 1.	" 9	20	60	6	.		
3	Henderson's Metropolitan.	Henderson..	" 22	" 1.	July 29	20	60	5	6	15	17
	Country Gentleman.	Burpee.	" 22	" 1.	Aug. 10	20	60	6	6		
4	Fordhook Early.....	"	" 22	" 1..	July 27	20	60	4	6	13	14
5	Devitt's Early	Ont. Seed Co	" 22	" 1.	" 25	20	60	3	6	23	17
	Stowell's Evergreen.	"	" 22	" 1	Aug. 9	20	60	5	6		
6	Early Malakoff.....	C.E.F	" 22	" 1	July 25	20	60	3	6	16	16

1. Quality good.
2. Green, fair, long cobs.
3. Good quality and shape.
4. Poor no flavour.
5. Good quality and shape.
6. Too ripe, well filled, good corn.

Vegetable and Date of Harvesting.	Variety.	Received from.	Date of Sowing.	Date of Germination.	Date of Ripening.	Amount Planted.	Amount Harvested
						Hills.	Lbs.
Squash— Oct. 31, 1911.							
	Long White Bush Marrow	Vilmorin	May 22	May 29	July 21	3	66
	White Congo	"	" 22	" 6	Aug. 15	3	5½
	Mammoth White	"	" 22	" 29	" 1	3	45
	Hubbard	"	" 22	" 29	" 4	3	30
	Delicata	Thorburn	" 22	" 29	July 21	3	86
	Summer Crookneck	Rennie	" 22	" 29	" 22	3	57
	Long Vegetable Marrow	Vilmorin	" 22	" 29	" 26	3	217
	Custard Marrow White Bush	"	" 22	" 29	" 26	3	104
Tomatoes— Harvested Green Oct. 18 1911.							
	Greater Baltimore	Ont Seed Co	April 17	June 3	July 27		36
	Livingstone Globe	Thorburn	" 17	" 3	" 21		38
	Chalk's Early Jewel	Ont Seed Co	" 17	" 3	" 24		24
	Earliana	"	" 17	" 3	" 21		29
	First of All	"	" 17	" 3	" 21		22
	Rennies XXX Earliest	Wm. Rennie	" 17	" 3	" 10		37
	Spark's Earliana	C.E.F. 1910	" 17	" 3	" 21		16
	Trophy	Dreer	" 17	" 3	" 25		19
	Spark's Earliana	Burpee	" 17	" 3	" 21		19
	Bonny Best	Harris	" 17	" 3	" 25		13
	North Adirondack Earliana	Langdon	" 17	" 3	" 10		28
	Plentiful	Ont Seed Co	" 17	" 3	" 24		8
	Florida Special	Bogliano	" 17	" 3	" 24		12
	Matchless	Burpee	" 17	" 3	" 24		9
	Chalk's Early Jewel	"	" 17	" 3	" 24		8

Experimental Hedges at the Dominion Experimental Farm, Agassiz, B.C.

Name.	Height.		Width.		Condition.	Injury. Winter Kill.	Remarks.
	Ft.	Ins.	Ft.	Ins.			
1. Deutzia	3	5	3	5	Good		Somewhat mossy.
2. American Arbor-Vitæ.	4		6		"		
3. Pyramidal Arbor-Vitæ.	4	5	3			By snow.	
4. Deutzia	3		2		Poor.		Failure.
5. Californian Privet	6	5	5		Good		Mossy.
6. Deutzia	7		4	5	"		
7. "	3	5	2		Fair.		Poor hedge.
8. Irish Juniper	4		4		Poor.	Somewhat	Half a hedge.
9. Swedish Juniper	3		4	5	Good	Some 10 ins.	Part good.
10. Syringa	4	5	3		Fair.		Mossy.
11. Thunberg's Barberry	4		4	3	Good		Somewhat mossy.
12. Berberis Amurense	4	5	2		Poor.		
13. Acer Ginnala	6		4	5	Good		
14. Mixed Deutzia	5		4	6	"		Somewhat mossy.
15. Removed.							
16. Red Honeysuckle	7		4	6			Very mossy.
17. Japanese Quince	4		4		Fair.		Scraggly & mossy.
18. Removed.							
19. Removed.							
20. Hemlock	4	6	4	6	Good		Good.
21. Golden Arbor-Vitae	3		3		"	By snow somewh't.	"
22. Calycanthus Floridus	6	6	4	6	Poor	Badly broken	Very scraggly.
23. " "	6	6	6		Good		Mossy.
24. Yew	1			9	"		Young, one year.
25. (Thorn)	2	6	1	6	Poor.	Badly broken	Cut down, 1911.
26. Norway Spruce	3		3	6	Good		
27. " "	4		5	6	"		
28. European Holly	4	6	5		"	Snow damage	Some broken.
29. " "	6		4	5	Fair.	" "	Badly "
30. Forsythia	4		4		Poor.	" "	Should be lifted.
31. Deutzia	4		2		"	" "	Cut down, 1911.
32. Retinospora Squarrosa	3		3	6	Fair.		A little blighted.
33. Yew	3		3	6	Good		
34. Californian Privet	4	6	5		"		Mossy.
35. Black Thorn	2	5	2	5	Fair.	Snow damage	Cut in 1911.
36. Ilex aquifolium ferox						Badly broken	
37. Pine, removed							A few bushes.
38. Golden Willow	4		4		Good	Snow damage	
39. Rosemary-leafed Willow	1	6	2		"	" "	Badly broken.
40. European Beech	3		4		"		
41. Box Tree	1			6	Fair.		1 year old.
42. English Thorn	5		4		Good		
43. Birch, removed.							
44. Acer Campestre	5		5		Good		
45. Birch, removed.							

CATTLE.

On April 1, 1911, there were on hand a herd of pure-bred Shorthorns, consisting of twenty females, young and old, one stock bull and four young bulls. During the month, four fat cows which were non-breeders, were sold to the butcher and later on in the summer the rest of the herd was sold to a rancher in the upper country. All were tested before sale and found free from tuberculosis.

In December, 1911, twenty-eight grade Holstein cows and one pure-bred bull calf of the same breed, bought under your direction in Eastern Ontario, were received here. They arrived in fair condition, nearly all being dry, one having calved on the cars *en route.*

They were put in and fed at first on mixed hay 15 lbs., clover silage 20 lbs., roots 10 lbs., mixed grain 4 lbs., with salt once a day and water twice a day in the mangers. This ration was continued until they were well up in condition, when their feed was changed to corn silage which was increased to 45 or 50 pounds per day, depending upon the cow. The meal ration was lowered to one and one-half pounds of bran per day. They were weighed once each month and, with very few exceptions, made most substantial gains and all that calved were in first-class condition at that time. After calving they were fed about the same roughage and, depending somewhat on the cow, they got one pound of mixed grain, valued at 1·6 cents per pound for every three or four pounds of milk given. This gave us the results tabulated below. Taken from January 1 to March 31, these figures are actual results and worth only what they represent, which is the first period of lactation of cows after a long train trip and before being acclimatized. Cows 9, 27 and 28 would not be comparative as we do not know exactly how long they have been milking.

Records of Dairy Herd.

No. of Cow.	Date of Calving.	Calf Dropped.	Value of Calf when Born.	Days Milking.	Amount of Meal Eaten.	Amount of Silage and Roots Eaten.	Amount of Hay Eaten.	Total Value of Feed.	Pounds of Milk Produced.	Cost to Produce 100 lbs. Milk.	Value of Skim Milk at 25 cts. per 100 lbs.	Gain or Loss in Live Weight.
			$ cts.		Lbs.	Lbs.	Lbs.	$ cts.	Lbs.	$ cts.	$ cts.	
2	December 4th, 1911	Heifer	10 00	91	840	4,550	1,365	30 69	2,785	1 10·29	6 26	Gain.
3	January 28th	Bull	5 00	65	806	3,250	975	25 07	2,718	92·23	6 14	Loss.
5	March 1st	"	5 00	31	312	1,550	465	10 79	938	1 15·03	2 11	"
6	February 26th	"	5 00	35	528	1,750	525	14 99	1,584	94·63	3 56	"
7	January 20th	"	5 00	72	834	3,550	1,065	26 64	2,883	92·40	6 33	Gain.
8	March 1st	"	5 00	31	389	1,550	465	12 02	1,169	1 04·53	2 63	Loss.
9	In calf			75	551	3,750	1,125	22 86	1,460	1 56·57	3 28	"
10	February 24th	Heifer	10 00	37	464	1,850	555	14 35	1,394	1 02·94	3 13	Gain.
11	January 2nd	Bull	5 00	89	869	4,450	1,335	30 50	3,061	99·64	6 88	"
12	January 21st	"	5 00	70	877	3,500	1,050	27 15	3,034	89·48	6 82	Loss.
13	March 15th	Heifer	10 00	16	261	800	240	7 17	784	91·45	1 76	"
16	February 13th	"	10 00	47	706	2,350	705	20 09	2,120	94·76	4 77	"
17	March 17th	Bull	5 00	14	216	700	210	6 07	634	95·74	1 40	Gain.
19	March 6th	Heifer	10 00	25	536	1,250	375	10 05	1,008	99·70	2 27	Loss.
22	March 19th	"	10 00	12	163	600	180	4 85	490	98·97	1 10	"
24	January 26th	"	10 00	65	685	3,250	975	23 14	2,210	1 04·70	4 97	Even.
25	March 8th	"	10 00	23	339	1,150	345	9 72	1,017	95·57	2 29	Loss.
27	Aborted November 18th, 1911			91	717	4,550	1,365	28 52	2,086	1 36·72	4 67	Gain.
28	Aborted November 21st, 1911			75	519	3,750	1,125	22 35	1,284	1 74·06	2 89	"

By March 31, 50 per cent of the calves that came were bulls, but as we do not know anything of the back breeding of any of the cows, we are raising all the heifers and are turning off the bulls as veal.

The heifer calves are all dehorned when they are four or five days old, by clipping the hair off the nubbin, damping slightly and rubbing caustic potash on. At this age the calf does not mind it and the results are entirely satisfactory.

The young heifers are fed on whole milk after having one or two feeds from their dam while in a loose box with her. They are given about a gallon of milk per day at first, gradually increased to a gallon and a half at three weeks, then as the calf begins to eat oats and bran, the whole milk is gradually supplemented with skim milk, until at twelve to sixteen weeks they are on skim milk exclusively, bran, oats, roots and silage and what hay they will eat. They are kept in light, airy stalls in the old barn, well bedded with cut straw, and are cleaned out as soon as the bedding gets soiled. Once every ten days or so, all the litter is cleaned out of the pens, and the walls sprayed with a light disinfectant to keep down any lice or vermin. There has been no trouble with them of any nature and the calves are strong growing youngsters, full of life but not fat.

The routine of work in the stables is as follows: Milking in the morning starts at 5.15, followed with a very light feed of hay while the men are away at breakfast. Then feeding of silage and roots, upon which the grain is put and a pinch of salt, after which water is given. While the feeding is going on, the stables are cleaned, fresh bedding put down and by 10.30 the floors are all swept. On all fine days the cows are turned out in the yard where they can lie down and get water as they wish, or, if it is damp, they come in after 1 o'clock and rest in the stable. All odd jobs are done before 3.00 in the afternoon, when the cows are again fed silage roots and grain. The cows are then cleaned up for milking which starts at 4.30, after which they are watered, given what hay they will eat and their beds fixed up for the night. After supper all hay thrown out is placed in the mangers and they are left to rest and ruminate until morning.

HORSES.

At present there are on hand two heavy draft teams, purchased this spring, one team being three-quarter-bred Clydes, mare and gelding, weighing 3,500, four years old, the other team being half-bred Clydes, mare and gelding, six years old, weighing 3,300; these weights are of the horses in medium to thin flesh. We have also two teams of light draft geldings, 2,800 and 3,000, and aged, and one general purpose mare, 13 years old and somewhat crippled. One heavy draft gelding was disposed of last fall; he was bought in 1889 and was worn out, having served his time of usefulness. Two broken-winded and otherwise crippled geldings, weighing about 2,600 pounds, were sold during the winter.

The teams were kept busy during the winter on all kinds of work whenever it was possible to get them out. They are all in good condition, and at the time of writing, standing the rush of spring work well.

SHEEP.

At the beginning of the year there was on hand a flock of 20 ewes and 4 lambs, all of the Dorset Horned breed. During September an addition was made to the flock in the shape of a ram lamb bought by you. He has turned out to be an excellent specimen of the breed and is in prime condition. Last year we sold three old ewes as mutton, and two ewe lambs and two buck lambs were sold as wethers, on account of their being inbred to too great an extent, and in the coming spring we will sell another old ewe as a non-breeder.

All the other ewes had lambs in the early spring of 1912. As one aborted and two others gave birth to full-grown dead lambs, this leaves us a crop of 16 lambs, four of which are ewes and the remaining twelve, rams.

The sheep were pastured on a piece of waste land, all summer, and not having had lambs, were very fat in the fall. We have been very fortunate in not having had any trouble with either wild beasts or dogs, and as our pastures are now arranged to avoid this to a great extent, we hope to have overcome this difficulty.

The following is a statement of the expenditure and of the income derived from the flock last year:—

Feed during the winter—		
Hay at $15 per ton, 750 lbs.	$ 5 62	
Roots at $3 per ton, 3,150 lbs.	4 72	
Mixed grain at $32 per ton, 1,320 lbs.	21 12	
Salt.	1 00	
		$32 46
186 lbs. wool at 9½ cents per lb.	$19 67	
4 lambs at $6.	24 00	
3 ewes.	37 83	
		81 50
Profit excluding labour.		$49 04

We have also to the credit of the flock, 16 lambs of varying ages, and one non-breeding ewe. Although the sheep were visited almost every day, the labour attached to them was very small until December, and from then till lambing time, which started early in February. This is a branch of farming which seems to pay exceptionally well for the capital invested, when once put on a running business basis.

The average period of gestation during 1911-12 was 148·5 days.

SWINE.

Although no experimental work has been done with swine this year, we have maintained two small pure-bred herds as breeders, namely Yorkshire and Berkshire. The best of the litters were registered and sold as breeding stock to people in the province, and those that did not come up to the standard at from ten to twelve weeks of age were turned off later as butcher hogs. Up to date the demand for breeding stock of both breeds has exceeded the supply by 65 per cent, the demand for either sex being about equal.

Before December no milk was available and it was more expensive trying to raise and fatten hogs on grain, roots, pasture or green feed, than it has been since that date when a quantity of skim milk has been fed.

All boars and sows are run on clover pasture and either sleep in the piggery or in 'A'-shaped cabins. We have found the cabin method to be most satisfactory in this district.

With an increase of accommodation we could most profitably increase our herds and do some breeding and feeding under British Columbia conditions, which should prove of value.

At the beginning of the year, there were three Yorkshire sows and one aged boar of the same breed and a small number of young pigs of all ages and sizes: one Berkshire boar and one crippled sow with a litter of six. This sow was lost at farrowing time later on in the year, and an unborn litter of eleven with her.

At present there are on hand in Yorkshires, one boar (Summerhill Jerry 21st —28494) three years old, weight in breeding condition, 650 lbs. Two sows (Maid of Kent 7th—31958) two and a half years old, weight in breeding condition five hundred

pounds, and (Clarilel 40th—26604) four years old, breeding weight four hundred and seventy pounds. There are also two young sows, daughters of Maid of Kent, which we are keeping as breeders, but they are not yet old enough to be registered. In the Berkshire stock there are one boar (Ottawa Chance 52nd—26741), ten months old, weight in breeding condition two hundred and sixty pounds, and two sows (Ottawa Luck 55th—26744), eleven months old, weight in breeding condition two hundred and thirty pounds, and (Ottawa Irene 4th), ten months old, weight in pig two hundred pounds.

All the Berkshires are young and were received from the Central Experimental Farm at Ottawa in December, 1911. They are excellent specimens of the breed, and a young sow or two will be kept from them as breeders.

The income from the swine for the year has been:—

Yorkshires sold for breeding	$125 00
Berkshires sold for breeding	50 00
Sold as butcher hogs	194 50
Services of boars at $1.00	11 00
Total	$380 50

POULTRY.

In the spring there was a small pen each of Barred Plymouth Rocks, Black Minorcas, Rhode Island Reds, Buff Orpingtons and White Wyandottes; these five breeds were kept separate and eggs from them sold for hatching. About one hundred and twenty-five chickens were hatched of the various breeds, under hens. They were kept in a continuous house with a small pen each and a small yard outside. In the summer, after the breeding season was over, they were allowed to run at large, which method, however good for hens, was not good for the other branches of the Farm.

During the summer, the old hen-house, which was on the site of the new barn, had to be hauled away, and three small houses, of the Wood's, Tolman's and Gilbert's Cotton Front types respectively, were erected on a piece of land, about two acres, which included the nut orchard, and which was set apart and fenced with a cheap but practical and permanent fence. Each of the houses was divided into two pens, and, in the fall, pens were started of the various breeds. The White Wyandottes, which were not very good specimens of the breed, were disposed of, and, owing to the popularity of the breed on this coast, a S. C. White Leghorn pen, comprising ten females one year old and a cockerel were purchased. We also purchased a fresh pen of Barred Plymouth Rocks and a cockerel. The oldest birds of the original pens were disposed of and supplemented with pullets of the year's hatching. These pens were kept during the winter on known rations, such as are given below, and an exact record kept of the number of eggs laid per pen. In the case of the younger pens, the birds were trapnested, records of each bird being kept to permit of the selection of the best breeding stock in the spring.

Early in the spring, a yard was built for each pen of birds and the best layers selected and put with a cock for the breeding season. Three small incubators were purchased, namely, the Tamlin's Nonpareil, the Jubilee and the Prairie State.

During the cold spell in the winter, which lasted about a month or six weeks, all the pens had to be equipped with cotton fronts on account of the drifting snow and the winds. One storm, coming earlier than usual, almost completely covered some of the houses, but the cotton fronts prevented any discomfort inside.

As this branch of farming is one of the most popular on the coast, an effort was made to put the poultry work here on a practical basis and, by the fall of 1912, it is hoped to have greatly enlarged flocks, especially of the White Leghorn and

Barred Plymouth Rock breeds. As soon as sufficient accommodation can be had in the shape of a laying house, some experimental work in the line of housing and feeding for coast conditions will be attempted.

One feeding experiment was conducted with a number of cull chickens, the results of which are tabulated below. As these were all the fowl available at the time, only the one test could be carried on. Another year, it is hoped to have more stock at hand for experimental work.

The accompanying sketches illustrate the styles of houses used on this Farm. (Fig. 1) gives the ground floor and sectional plan of the Wood's Open Front House. The open front on this house measures 2 feet x 16 feet and in winter the birds are protected by a light cotton screen which is dropped over the window. Fig. 2 is the Tolman Open Front House, the open front on this house being 3 feet x 16 feet, the same system of cotton screening the windows in winter time being used. Fig. 3 is a modification of the Gilbert Open Front House. The double boarding at the back and the cotton screen over the roosts have been omitted as the climate in this district is not severe enough to call for it. These houses have been used throughout the past winter, which has proved a hard one for wind and snow, and on one occasion the Wood's house was buried in snow to the peak, but the cotton screen did its work admirably and kept everything snug inside. Fig. 4 is a sketch of the style of brooder house used here; this house has two open fronts and one window, is portable, and after the young chickens are brooded, can be used as a colony house. It is sectional, easy of construction, and will accommodate about 200 young chickens.

CHEAP RATION FED TO POULTRY.

On a basis of ten hens. *Per day.*

1 lb. wheat fed in litter in morning.
2 lbs. or so of sprouted oats or of mangels—noon.
1½ lbs. oats and barley mixed—night.

Hopper with a mixture of: *Per month.*

4 lbs. shorts.
8 lbs. bran.
4 lbs. ground oats.
2½ lbs. beef scrap.

Water, grit and oyster shell before them all the time.

For newly-hatched chickens we have used very successfully the following methods and foods.

Keep fasting from 48 to 72 hours, then give small grit. For the first day chopped hard-boiled eggs at the rate of three to thirty-five chickens. Second day, bread squeezed dry from skimmed milk and half the ration of eggs. Third day rolled oats. Fourth day ground wheat, rolled oats and water. From this time on they are fed ground wheat, rolled oats, beef scrap, and a little charcoal, until they are old enough to take coarser foods.

At the time of writing, we have not had many chickens to work with as the incubators have not yet hatched but, judging from the experience of the spring of 1911, and as far as we have gone this spring, the method works very well.

FEEDING EXPERIMENT.

TOTAL WEIGHTS IN POUNDS.

Breed.	At Start of Experiment.	First Week.	Second Week.	Third Week.	Average Gain per Bird.	
					Lb.	Oz.
12 B.P. Rocks	47	55	60	62	1	4
1 W. Wyandotte						
1 B. Orpington	11½	14½	16	17	1	13⅓
1 Rhode Island Red						

Feed consumed :—

Oats and Barley	36 lbs.
Mash	64 "
Milk	40 qts.

The last week of the experiment was cold and the mash froze before the birds had a chance to get their fill of it.

The services of a poultryman, Mr. Fred. Nelson, have been secured, who, in addition to doing other work when the flock was small, built and fitted up the hen houses, made the brooders, trap nests and portable chicken houses, feed boxes and almost everything in the line of poultry necessities except incubators. He has made, for trial during the coming season, several styles of brooders, chicken houses and colony houses.

A considerable amount of data has been collected but, as it only covers part of one year, it is reserved for future publication when further experiments have made the results obtained more accurate and comprehensive.

BEES.

With the opening of April, there were fifteen swarms of bees in the apiary. They were strong and had sufficient stores and were working as though they would produce honey although it was almost an impossibility to see the inside of the hives. Swarming commenced very early, and the better part of the honey season was lost in wasted energy in this direction. On account of not being able to secure bee material for prompt shipment, much time was lost in the spring before anything could be done, and it was July before the material was received to make suitable hives; at this time of the year the bees were transferred from the old boxes to the 10-frame Langstroth hives, and any stores which could be transferred, were, but this left them in new hives, with insufficient food, and the honey flow ceased. Quite a number of swarms were caught and hived, but many flew away before we had anything to put them into. During the summer two strong swarms were sold.

In the fall, some of the weak hives were combined with the strong ones, and were fed a very small amount, varying from two to seven pounds of sugar, melted down to a syrup. When combined there were fourteen hives, strong as regards bees, but weak in stores. Sufficient honey was sold from the old hives to more than pay for the sugar that was fed to them in the fall.

As the old hives were distributed around a large area of ground among the hedges, on November 11, they were gathered together in one place and left until the spring. The bees made their first flight on January 16. During the latter part of February the hives were placed on a long low stand by pairs, and it was then found that one swarm was dead. This stand, although not thought to be the best arrangement, was the only one that was practicable at the time.

Three trials were made with winter housing, one strong swarm was fed 6 lbs. of sugar, left with the summer entrance to the hive, an extra super on top, and the feeder inside. This hive was left by the hedge in the middle of the lot. Another strong swarm was fed the same and put into an open shed facing south. Another original box hive which had not been touched during the year, but which had swarmed itself weak, was left in its original place in the open. During the winter, the two outdoor swarms were buried in a snow drift to the depth of five feet, which was allowed to melt away naturally. In the spring, the one in the shed was strong and active, with some stores, the boxed swarm had died, and the one with the super was active, although weak, and very short of stores.

The hardest time of the year on the bees appears to be in March, when there is a warm sun alternating with cool winds and sharp showers. The bees go out to work for pollen, are knocked down by the cool breezes and showers, and many of them never return to the hive.

Within a year or two, when the White Dutch clover, and Alsike, which are now being sown in the hay and pasture mixture, take effect, we should be able to report much more development along this line, for at present we are hardly in working shape.

On March 30, all the hives were working well, though two more had died; in all the remainder the queens were beginning to lay, and pollen was coming in. They are very weak in stores, but strong in numbers, with few exceptions. There are now eleven hives, five of which are in first-class working condition, and should produce honey during the coming season. A good supply of bee material was bought, although the quality in this province is poor and the price high, and we have now a sufficient amount of hives, frames and fittings for the same to last for a few years and run an apiary of twelve to fifteen hives in good order.

BUILDINGS.

In view of carrying on dairy and other live stock operations on the Farm several buildings had to be erected and the old barn remodelled, the total amount of building and removals being: Dairy barn and dairy built, old barn remodelled and cement floors put in, horse barn remodelled, two silos and three small hen-houses built, old hen-house moved to hog-house, a small coal shed built, the implement shed finished, a new system of water pipes and a concrete and stone reservoir almost completed on the mountain, as well as about a mile of wire fencing bought for fields and yards. We also had charge of building for the Health of Animals Branch a stable, a laboratory and a small shed.

Figure No. 1 is diagrammatic of the improvements put on the old barn and the dairy barn that was built and shows the general arrangement of the ground plan including lighting, alleys, stalls, pans and the water piping in dotted lines.

The horse barn will hold eleven horses. The old barn has loose boxes for sixteen to twenty-four calves, a special bull pen and two loose boxes for cows or young bulls, and has a root cellar at the back separated by a stone wall. The cow barn has tying room for forty cows, giving each stall 3 feet 6 inches width, 10 square feet actual glass per cow and when full would have 767 cubic feet air space for each cow. The feed and mixing room is 22 feet x 24 feet, and the silos are 18 feet 2 inches and 14 feet 4 inches by 30 feet high. The weigh room or porch is 10 feet x 10 feet facing the dairy and connected to this latter place by a cement walk 100 feet long.

Figure No. 2 shows the new dairy stable in more detail and enlarged, size 85 feet x 38 feet x 9 feet 5 inches. Solid black lines indicate walls made of 2 inch x 6 inch studding, covered outside with rustic and two plies paper and inside with 1-inch x 4-inch dressed scantling (not V-joint); this is white washed. Four lines indicate windows which have 4 feet x 5 feet glass, two sashes, the top one on hinges opening in

and down from top and can be adjusted from 1 inch to 1 foot. Double lines show doors. Square black marks indicate wooden posts which support loft; a dust-proof floor and ceiling is above. Small double lines inside indicate iron stall fixtures of the James type somewhat modified. The single lines indicate the floor basin for feed and water and the galvanized iron mangers, also the gutter. Single dotted lines show water pipes on ceiling and double dotted lines the drainage from roof, mangers and in case of washing up, from the gutters. The large circles are the silos which are 18 feet 2 inches and 14 feet 4 inches by 30 feet high with roof on them. They are built of 2-inch x 6-inch x 30 feet fir dressed on inside and edges and have eleven hoops $\frac{3}{4}$-inch iron in four pieces. The silos are joined to the building 12 feet up and then a tube runs to the top into which both sets of doors open. The small building joined to the feed room has a sink and closet for use of the men on the farm and the stable men.

Underneath the cow stand, which has the same amount of concrete and the same mixture as the rest of the floors, there is a foot of field stones and six inches of gravel to make it drier and warmer. The feed alleys are 6 feet 5 inches from wall to manger basin. The cow-stands taper from 5 feet at one end to 4 feet 6 inches at the other and the alley between the cows is 8 feet wide. The gutter is 20 inches wide and 7 inches from bottom to cow stand and 4 inches from bottom to alley behind. The whole floor slopes from end to end 2 inches, except the manger basin which is $1\frac{1}{2}$ inches. We do the feeding from a truck and clean the manure out at present with a wheelbarrow.

Figures No. 3 and 4 show ground floor and upper floor plan of dairy which is 20 feet by 28 feet and 14 feet studs. This is not quite completed. It is fitted with cement floors and wooden walls. The boiler room is built on and we have a general room next for churn, separator and wash room, a small storage room, a cheese room, and small office or entry room from which the stairs lead. Up stairs there are three small rooms and a bath room for the use of the person in charge of the dairy.

When finished and equipped, it is hoped to have a practical farmer's dairy for a herd of forty cows.

WATER SYSTEM.

In order to get a supply of water for the increased number of live stock, a new water system was required at the Agassiz Farm. At the height of 130 feet up the mountain at the back of the Farm, a quantity of rock was blasted out on the site of the old tank and, utilizing the old foundation as far as possible, a reservoir of concrete and stone is being built, which should hold, when completed, slightly over 20,000 gallons. Starting from the barn, 2-inch galvanized iron pipe has been laid 1,600 feet out and the remaining 1,200 feet required to carry the line to the tank with $2\frac{1}{2}$-inch pipe of the same quality. The work was not begun until late in the fall and, as it was necessary to carry cement and sand up the mountain in very small sacks, winter came on before much had been done. The work is being continued this spring and at the present favourable rate of progress, should be completed in April. At present, water is being obtained from a very small temporary dam half-way up, but there is very little head and only a limited supply. When finished, the dam should provide an excellent water supply both for the stock and for fire protection.

CLEARING LAND.

About five acres were grubbed and ploughed, four acres ploughed the second time, and harrowed and disced at intervals of two or three weeks during the season of 1911. This area will be planted to corn in order to bring it into the rotation.

The five acres that were broken will be sown to pasture for next year.

Clearing and breaking land was only done to keep the men and teams busy on days unfit to work on other jobs, and, on account of the extra amount of building going on, this work did not receive the attention it should.

DITCHING.

Four thousand four hundred and thirty-five feet (4,435) of ditch was brushed and burned, six feet along each side. Two thousand and thirty feet (2,030) of the same was widened and deepened from one to two feet. Six hundred and thirty feet (630) was deepened from four to six feet, and boxed with two-inch rough planking, twelve inches by twenty inches.

IMPLEMENTS.

The change in the whole system of farming operations here necessitated the buying of a considerable number of farm implements, which were all of the larger, three and four-horse, type. They include two double-furrow ploughs, two drag harrows, a manure spreader, two farm trucks, two single cultivators and one hay rake. Among the smaller implements bought were a double-mouldboard plough, a fanning mill, a sheaf carrier for the binder, a pea harvester, two sets of double harness, one set of single harness and a buggy. During the year, a 20 h.p. gasoline engine and a Blizzard cutting box were also purchased.

FENCING.

One carload of 6-inch x 6-inch x 8 feet cedar posts, and three hundred and sixty rods of 10 x 54 Page wire fence were bought and erected round the yards and lanes preparatory to the handling of the stock.

MEETINGS.

During the year, very little travelling was done in the province, on account of the nature of the work on the Farm. Beyond a few trips to Vancouver in the interests of our building operations, I attended several meetings of the directorate of the British Columbia Dairymen's Association, the annual agricultural fair at New Westminster, and the annual meetings of the British Columbia Dairymen's and Stockbreeders' Associations at Victoria.

In February, twenty days were spent on a trip to Ottawa to attend the meetings of the National Live Stock Association, the Canadian Seed Growers' Association, and the Dominion Fruit Growers' Conference, and for meetings of all the Experimental Farm Superintendents with yourself and the Honourable, the Minister of Agriculture. The meetings proved most helpful, especially those of the Superintendents, as they helped to simplify and harmonize our work, and my thanks are due to the Honourable the Minister of Agriculture, and to yourself, for affording me this opportunity.

POTATOES—Distribution of Samples.

Variety.	Number of Samples sent out.	Percent. Reported on.	Number of Reports good.	Number of Reports poor.	Number of Crops reported clean.	Average Weight of same.	Number of Crops reported scabby.	Average Weight of crop.	General opinion of Potato, as to quality, etc.
Vick's Extra Early	15	16	....	.....	...	.....	.....	.....	.....
Money Maker	76	26	60	40	71	84	39	103	Fair.
Early White Prize	24	41	90	10	66	51	34	109	Poor.
Burnaby Mammoth	56	44	75	25	65	100	35	157	Fair.
Ashleaf Kidney	45	44	74	26	62	58	38	74	"
Early Potentate	40	20	100	.....	66	73	34	134	"
Gold Coin	80	34	72	28	65	57	35	71	Very good.
Empire State	31	25	66	34	50	98	50	61	"
Early Rose	42	26	55	45	74	53	26	113	Fair.
Early Envoy	34	29	50	50	86	95	14	240	Poor.
Dreer's Standard	26	33	66	34	68	101	32	98	Fair.
Carman No. 1	67	48	84	16	83	97	17	81	Very good.
Late Puritan	18	33	100	.....	50	69	50	77	Fair.
American Wonder	42	29	83	13	100	80	.....	.....	Poor.
Rochester Rose	69	12	60	40	100	100	.....	.....	Very good.
Seedling No. 2	37	27	87	13	100	125	.....	..	Poor.
Dooley	18	19	....	..	..	.....	.....	.....	.....
Irish Cobbler	22	41	86	14	50	37	50	70	Good.
Everett	10	40	.....	.....	.....	.....	.....	.....	.....
Morgan Seedling	5	34	.....	.....	.....	.....	.....	.....	.....
Bovee	6	14	.....	.....	.....	.....	...	.....	.....

Seven hundred and sixty-three samples were sent out of twenty-one different varieties; about a third were reported on. The Vick's Extra Early, Dooley, Everett, Morgan Seedling, and Bovee varieties had so few reports sent in that it was not possible to gather any data from them. In most cases the Seedling No. 2 was reported on as a poor variety on account of its roughness and the deepness of its eyes. Reports from all over the country stated that it had been a very bad season for potatoes.

CORRESPONDENCE.

Letters received during year	2,825
Letters sent out during year	2,635
Circular letters *re* seed distribution	763

ACKNOWLEDGMENTS.

I beg to acknowledge to you, sir, the thanks which I owe to you for your assistance and advice, and to the other officers at the Central Experimental Farm who have helped me during this, my first year as Superintendent of this Farm. My thanks are also due to Mr. Alex. McKay, farm foreman, Mr. W. G. Harris, herdsman, Mr. H. L. Keegan, who had charge of all the stock until December, and later devoted his attention to the swine and sheep, Mr. Fred Nelson, poultryman, Mr. N. B. Roy, assistant in the office, and to all those on the Farm who have stayed with me throughout the year, who, by their loyal assistance and interest in their work have enabled me to report as I do.

METEOROLOGICAL RETURNS.

	Maximum Temperature. F.		Minimum Temperature. F.		Precipitation.	Sunshine.		
						Days.	Hours.	Minutes.
1911	Date.	°	Date.	°	Inches.			
April.	30	75	6	26	2·62	29	215	12
May.	31	81	20	36	6·75	22	141	54
June..	14	83	19–20	35	1·65	24	175	18
July..	15–24	94	5	42	1·12	23	226	18
August.	25	84	15	42	2·97	24	178	.
September.....	1	80	24	40	4·91	18	115	28
October	10	71	27	30	3·57	25	147	06
November.....	1	63	11–13	12	10·50	13	38	18
December	6–18	53	30	10	7·69	16	42	42
1912.								
January..	31	53	2, 5–7	12	4·31	15	61	24
February.	9	54	22	28	10·66	15	70	54
March	30	65	8	26	2·18	29	207	.
Totals.....					61·93	253	1,619	34

NOTE.—In the above table of meteorological returns, ten inches of snowfall is reckoned as equivalent to one inch of rainfall or precipitation.

I have the honour to be, sir,
Your obedient servant.

P. H. MOORE,
Superintendent.

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